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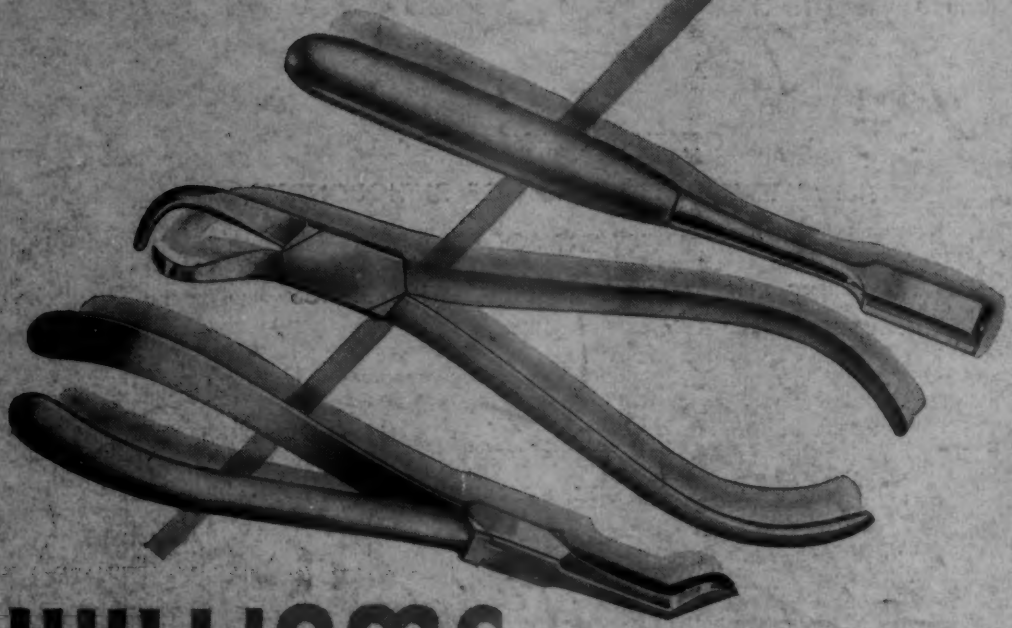

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Fred West, President of the
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VOL. 40 JULY, 1954 No. 7

Original Articles

PRESIDENT'S ADDRESS, GREAT LAKES SOCIETY OF ORTHODONTISTS

SCOTT T. HOLMES, D.D.S., M.S., MUSKEGON, MICH.

WELCOME to Twenty-fourth Annual Meeting of the Great Lakes Society of Orthodontists. It is my pleasure to join with the Grand Rapids orthodontists in welcoming you to Grand Rapids for the first time in our history. We sincerely hope that your visit will be both pleasant and profitable and that you will see fit to return many times in the future.

Since it is my duty as president to make an annual report, and your duty as members to listen to the said report and pass judgment upon it, I have suggested to the program committee that we dispense with this duty at the earliest possible moment. I reason much like the small boy who prefers to eat his spinach first so that he can then more thoroughly enjoy the rest of his meal.

My remarks today will constitute a joint report, since, during the past year, it has been my privilege to serve you both as your president and as your delegate to the American Association of Orthodontists. In both of these capacities I have been justly proud, because the history of our organization can always be referred to with great and just pride. Traditionally, our scientific programs have ranked with the very best and our organization has always allied itself with any movement for the advancement of orthodontics and orthodontists. On occasion I have been reminded that no Great Lakes Association member has ever been accused of "hiding his light under a bushel." I regard that as a compliment. We are proud of our organization. On the other hand, there is

Read at the Twenty-fourth Annual Meeting of the Great Lakes Society of Orthodontists, Grand Rapids, Mich., Nov. 2, 1953.

a great difference between just pride and complacency. As an organization we must be ever mindful of our opportunities for self-analysis and constructive self-criticism.

During the years our membership has grown tremendously, with twenty new members reported to the American Association of Orthodontists at the last annual meeting. This growth has been in spite of the criticism by some that our requirements for membership have been unreasonably high in the past. I feel that we have done the parent body a great service in these last few years by proving in deeds, as well as by words, that we firmly believe in the advancement of the standards of orthodontic training as a prerequisite to the clinical practice of orthodontics and to membership in the American Society of Orthodontists. I believe there is little doubt that our leadership and persistence in this category have been positive factors in increasing the requirements for membership in the A. A. O.

The action taken by the A. A. O. in St. Louis last year may indicate that we were progressing a little too rapidly, but that statement, too, may be open to honest difference of opinion. I am reminded of a quotation from the address of president Wilson Flint in Pittsburgh, in 1949, in which he said, "We all contend that we would like to see the standards of our profession improve. Unless the bylaws of individual components are so drawn that higher standards are fostered in one than in another, such improvement is made impossible not only in the component, but also, by gradual infiltration, in the parent body itself. The Association is not likely to raise its standards except as the result of a gradual rise taking place in the components one by one as they copy each other. One has only to look at progress in the general level of education and other divisions of our culture to see that segregated areas took the lead, others followed, and finally all areas were obliged to seek a higher level."

This quotation comes from the period when the Great Lakes Society was considering reducing its membership requirements to conform to those of the A. A. O. The following year, in his president's address, Dr. Martinek also discussed the matter quite fully in preparation for the membership vote on the amendment. He concluded his remarks on the subject as follows: "It has been traditional within this constituent to ally ourselves with the vanguard of any movement to improve orthodontics training in so far as it might be affected by membership eligibility requirements. You must decide whether we can help the area of the Great Lakes Society and the A. A. of O. attain their objectives the more by reverse or forward action." We voted to maintain our membership requirements.

All are familiar with the eventual action taken by the A. A. O. forcing all component societies to change their constitutions to conform exactly to the membership requirements of the A. A. O. You also are familiar with the resolution passed by this society at our last annual meeting in which we called attention to the great responsibility that the A. A. O. has now assumed in relation to future membership eligibility requirements. As your delegate to the A. A. O., it was my duty to present this resolution. The abridged minutes

of the Board of Directors meeting of the A. A. O. for April 26, 1953, read in part as follows: "Dr. Holmes on behalf of the Great Lakes Society of Orthodontists presented a resolution adopted by that Society, the resolved portion of which reads:

> 'That the Executive council of the American Association of Orthodontists be urged to appoint a special or standing committee to study methods of training orthodontists or embryo orthodontists and to make suggestions to constituent societies which would lead towards uniformity of training and the raising of standards of requirement for membership in constituent societies, and also be instructed to recommend additions or alterations to the Constitution calling for higher requirements for membership, from time to time.'

"After extended discussion, on motion, it was voted to comply with the request."

I am pleased to report that this special committee of the A. A. O. has been formed and has started its study. The committee will function under the very able leadership of Dr. John Thompson of Chicago, as chairman. The other members who have been selected to represent the various sections of the country are as follows:

George Hahn	Berkeley, Calif.
Alton Moore	Seattle, Wash.
Brooks Bell	Dallas, Texas
Ashley Howes	New Rochelle, N. Y.
Faustin Weber	Memphis, Tenn.

The Great Lakes Society has the honor of being represented by two members from its organization, Dr. Ernie Bach of Toledo and myself. (To those of you who have been present when Ernie and I have expressed our views on this subject, it will be evident that this is far from being a "packed committee.")

Since it has been repeatedly stated by all concerned that we are mutually interested in the improvement of orthodontics training and membership eligibility requirements, I am sure you will join with me in the sincere hope that this committee will be successful in its undertaking. It goes without saying, but it bears repeating, that the committee will be under the closest observation, and it might be well for this society to continue its constructive thinking on the matter so that it will be ever in readiness to assist or stimulate as the opportunity presents.

At this time I want to emphasize how tremendously I was impressed by my experience as your delegate to the A. A. O. I want to assure you that our parent body is well organized, efficiently managed, and firm in its purpose to serve the orthodontic profession to the best of its ability.

And now, since I am in the mood for passing out well-deserved bouquets, I want to extend my sincere thanks to the chairmen and members of all committees functioning during this past year. They and my fellow officers have been most cooperative, and I want them all to know how deeply I appreciate their efforts. Those who are particularly deserving of our thanks and praise are the program chairman, Dr. Culbert; chairman of clinics, Dr. Shehan; chairman of

local arrangements, Dr. VerMeulen; and our very hard-working, capable, and conscientious secretary-treasurer, Dr. Carl Anderson. He has served three years as our secretary-treasurer, and has done an excellent job. I want you to know, Carl, how sincerely I appreciate your fine service to our society and your excellent assistance to me personally. As Carl retires from this office he joins with me in recommending to you that the office of secretary-treasurer be broken down into two offices, namely, a secretary and a treasurer. Our society has now grown so large that it is too much to ask one man to fill both offices. This change has worked effectively in other component societies. The matter has been discussed with the Constitution and By-Laws Committee and they are prepared to make recommendations to you in a few minutes.

There is one other constitutional change which I believe would be desirable. The A. A. O. and most component societies have necrology committees. In the Great Lakes Society these affairs have been handled by the secretary. I recommend that we conform to the structure of the parent body and include a necrology committee among our standing committees.

There is another matter which I feel is of great enough importance to warrant our consideration at this time. The varied fields of orthodontic diagnosis and clinical therapy have received their just share of emphasis during the years of our history. There is one phase of our technique, however, which I feel has not received due consideration. I refer to the technique of patient referral and acceptance. In the event that one of your patients has moved to another city, have you ever been guilty of sending this partially treated case away with the remark, "When you get to Grand Junction, call my friend Dr. Bill Jones; tell him I sent you and if he wants any information, have him write me"? Or have you ever received a case from Dr. Smith with the same bit of information presented by the patient's mother with possibly the additional information that, "Dr. Smith assured us when we left that Mary's case will be completely finished in about another three months"?

Fortunately, all referrals are not handled as poorly as I have pictured, but living as I do in a resort area, I am continually impressed by the tremendous variation in the techniques of patient referrals.

I feel very strongly that wrapped up in this whole process of referral and acceptance of orthodontic cases lies one of the greatest opportunities the orthodontics profession has for strengthening its public relations. A patient moving to another community is always a bit confused in the new situation. He is rightfully concerned about his orthodontic future. Having invested time, money, and effort in this undertaking, he would not be human if he were not at least a little bit worried. How much happier he would feel if his orthodontist were to comfort him by words such as these: "Even though change of location does present certain problems, I can assure you that Dr. Jones will give you the finest of care in your new community. I will send the history of Mary's case, together with all casts, x-rays, photographs, and so forth, to Dr. Jones immediately. He will study these data and then determine the manner in which he feels he can best complete your daughter's orthodontic treatment. No two

human beings work exactly alike, and this applies to orthodontists. Dr. Jones may have some suggestions just a little different from mine, but he is a well-trained and sincere orthodontist. Naturally, all charges will be discontinued at this office and you will make your future financial arrangements with Dr. Jones.''

I feel that this type of warm and sincere personal referral has a comforting effect upon the parent and patient being referred, but it is a time-consuming method and admits of a great deal of variation. I am wondering if there is not some way that we, as an orthodontics society, can develop a more uniform method of handling our patient referrals. The method should be broad enough to include untreated observational cases, treatment and post-treatment cases, and even patients on medium, long, or extended vacations. The data could be compiled in the form of a short ''information card'' for vacationing patients, and a ''complete history card'' for permanent referrals. Patients on vacation could carry this ''information card'' with them. Such information would be of value to any orthodontist called upon to render emergency or vacation-time treatment. The ''complete history card'' would only be sent by one orthodontist to another and would be a supplementary method of transferring complete uniform information from one office to another. In general, some of the most important items that this ''complete history card'' could include would be the following.

1. Patient's name and address.
2. Parent or guardian.
3. Person responsible for payment of account.
4. Length of time under active treatment.
5. Résumé of treatment plan.
6. Present primary objective.
7. Supplementary appliance used, such as headcap, elastics, and so forth.
8. List of enclosed history data, such as casts, x-rays, photos, and so forth.
9. Financial arrangement for treatment.

Such a standard form for referrals should give considerable confidence to the parents and patients when we explain, ''This is the type of form used by all members of the Great Lakes Association of orthodontists (or possibly of the A. A. O.) in referring patients from one to another. It assures you that all orthodontists are mutually interested in serving the orthodontic needs of our patients, and I trust that this arrangement will help to make you and Mary just that much happier in your new community.''

Therefore, I recommend that this matter be given careful consideration and, if it meets with your approval, that a committee be formed to study and prepare suitable material and forms for our use. The committee also may see fit to formulate suggestions or rules particularly applicable to referral cases and other associated interoffice relations. I have a feeling that this undertaking

does not fall completely within the scope of any of our standing committees. I also feel that no member should be appointed to this committee who does not express some degree of enthusiasm as a prerequisite to committee membership. The members of this committee will have a difficult and responsible assignment, but they will have an opportunity of serving their profession on a matter of great importance to all of us. I sincerely hope that this suggestion meets with your approval.

In closing, I want to thank again all fellow officers and committees for their help during this past year, and to thank the membership for this privilege of serving as your president. I have great faith in the future of our organization, but I am reminded of the words of Paul Harris, the founder of Rotary who once said, "Is everything all right in Rotary? If so, God help us. We are coming to the end of our day." May our days be many and may we serve more fully as the result of constructive, critical, self-analysis—and then action.

1205 Peck St.

CLEFT LIP AND PALATE

Morphologic Studies of the Facial Skeleton

Egil Harvold, Oslo, Norway

THE treatment history of the cleft palate is short and interesting. It covers a period of approximately sixty years, telling us of the many efforts made by surgeons and prosthodontists to reduce the disadvantages that accompany this malformation. The people in our profession, the orthodontists, to date have taken only a small part in the development of what is now called modern cleft palate therapy. Since dealing with the growth and development of the facial skeleton (and the jaws in particular) is our special field, the severe growth discrepancies shown in cleft lip and palate cases certainly merit our attention.

Most orthodontists believe the underdevelopment of the maxilla as seen in cleft lip and palate cases, is to a large extent due to surgical procedures, especially at a very early age. As a further explanation, it is said the growth centers in the maxilla are affected in an unfavorable way. These statements are merely conclusions reached from experience gained after orthodontic treatment. Up to this time, very few surgeons have paid attention to this viewpoint. It is now frequently discussed, however, and in some centers the operations on the palates are postponed. The question is, Will the final results improve when surgery is postponed and the cleft in the palate is left open two or three more years? It may be fallacious to concur with this prevalent opinion, which emphasizes that surgery at an early age causes jaw deformation to such an extent that a delay is justified. I will not answer this, but I will attempt to shed some light upon it by presenting the results of some studies on the morphology of these deformed jaws and facial skeletons.

The importance of this problem can be illustrated by the fact that approximately one in every 800 children born has a cleft anomaly. Not all need our attention, but for at least 50 per cent of these children orthodontic treatment is imperative to good appearance and speech. These are the cases with a complete cleft in the lip, jaw, and palate, on one or both sides. This article deals with these types of cases.

Additional forms of the anomaly will not be considered here, even though they may include an irregular dentition. When the cleft is limited to the soft and hard palate, the other parts of the maxilla usually develop within normal

Read at the Twenty-fourth Annual Meeting of the Great Lakes Society of Orthodontists, Grand Rapids, Mich., Nov. 2, 1953.

From the Norwegian State Dental School, Oslo, Norway, and the University of Toronto, Toronto, Ontario.

limits; occasionally the contraction of the scar tissue in the palate may produce a slight narrowing of the dental arch in the premolar area. When the cleft occurs in the lip only, or in the lip and the alveolar process, the effect on the development of the jaw and dentition is very limited. Certain irregularities in the incisor area may follow, especially when supernumerary or malformed teeth are present.

It is the unilateral and bilateral complete cleft cases which present the greatest challenge to our abilities. The usual pattern of development after birth is as follows. When a child is born with a complete bilateral cleft, the premaxilla is carried forward by the nasal septum into a rather pronounced position with the alveolar process pointing forward. The lateral parts of the maxilla remain closer to their normal position.

If the case presents a unilateral complete cleft, the premaxilla is prominent and is deflected to the opposite side, while the relatively large nasal septum is curved over the cleft.

After the surgical closure of the cleft in the lip, the alveolar part of the premaxilla is gradually tilted downward and backward until it touches the lateral part of the maxilla. The position of the premaxilla should be more or less normal by the time the child is 1½ to 2 years of age. If at this time the front teeth have erupted and the overlapping is sufficient, the movement of the premaxilla is inhibited. If the overlapping of the teeth is insufficient, and a cleft still remains between the parts of the jaw, the alveolar process of the premaxilla will be moved further backward until contact is established in the cleft area.

Where the premaxilla remains in correct position, because of the occlusion, the cleft is closed by a medial shifting of the maxilla on the side of the cleft. This movement occurs especially after the operation on the hard and soft palate. The parts of the upper jaw will move together slowly until they touch each other. After the age of 4 or 5 years, it becomes difficult to find cases where the two parts of the alveolar process are not in contact. The parts are brought together by the lip pressure and by the tension of the soft tissues in the palate, until the alveolar processes are in apposition. This means that the development of the alveolar process in the region of the cleft determines, to a large extent, to what degree the upper jaw will be compressed. The development of the alveolar process is connected with the number, size, and direction of eruption of the teeth. Usually all the teeth are present in the deciduous dentition. Occasionally the lateral incisor in the region of the cleft has an irregular form, or perhaps a supernumerary tooth may be present. The position and the direction of eruption of the lateral and central incisors varies near the cleft. These conditions improve by eruption, however. This may be due to the effect of the tongue and the lip which often straighten the anterior deciduous teeth.

The dental arch is reduced in proportion to the lingual displacement of the premaxilla and the medial displacement of the maxilla. Often the crown of the lateral incisor erupts in the center of the cleft and prevents further de-

formity. If all the deciduous teeth remain in the jaw during this period, the occlusion will be quite stable from 3 to 6 years of age. Decay and extractions are factors that often lead to further reduction of the dental arch.

The condition often proves to be less favorable when the permanent dentition is already present. Absence of teeth is found in many cases, especially when the anterior part of the cleft in the palate is closed within the first few months after birth. Nevertheless, the main cause of later trouble seems to be inhibited vertical growth of the alveolar process, which normally provides the space necessary for the permanent teeth. When a complete unilateral cleft is present, the central incisor on the opposite side usually erupts first and it is in less danger of being moved lingually by the lip pressure. Often it partly occupies the space meant for the lateral incisor, however, and this tooth then erupts in a lingual position. The scar tissue in the lip rests against the alveolar process in the cleft region, and against the labial surface of the central incisor on this side during eruption. The result is that the central incisor frequently is tilted against the cleft in a rotated lingual position. The alveolar process in each of the two halves of the jaw is, as mentioned, usually found to be in contact. In this way, every reduction of the alveolar process in the region of the cleft, caused by either congenital absence of teeth or malposition in the permanent dentition, will lead to further compression.

If this medial displacement of the alveolar process takes place before all the teeth are fully erupted, which it generally does, then a corresponding reduction of alveolar growth in height will be noted. When the arch is compressed, the canine and premolars erupt lingually and the normal vertical growth of the alveolar process is obstructed by the tongue. Other factors also may influence the development of the maxilla. Most important is that the tight lip will inhibit the frontal growth of the alveolar area and possibly the forward growth of the jaw in relation to the other bones.

This is the general pattern of the development. The many factors involved in the process give us a wide range of results, but the trend is very similar in all cases.

It is evident this congenital malformation must have an effect on the growth of the face and the facial skeleton, but to demonstrate what is wrong or abnormal in such cases is rather difficult. Clinical experience obtained from orthodontic treatment of these deformities in the maxilla has proved that both the development of the alveolar process and the position of the teeth in the maxilla can be influenced easily by environmental factors, such as scar tissue contraction, and forces produced by orthodontic appliances. Further improvement in surgical and orthodontic treatment of these deformities is impeded by insufficient knowledge as to the extent of the different anomalies in the facial skeleton, and of the reaction in the tissues involved to the changes that arise due to treatment. Insufficient knowledge of the stability of these structures is due to the difficulty in clarifying which functions are predominant in form development in the different facial skeleton areas, and to what degree the genetically determined form of the bones is modified by mechanical functional stress.

The investigations, which Gilley[3] and Graber[4] undertook with the aid of profile roentgenograms, indicate that the major portion of the deformities is localized in the area of the maxilla which lies below the anterior nasal spine and the nasal cavity, that is, the alveolar process and its immediate surroundings. The patients used in these investigations included different types of harelip and cleft palate. Further investigations with the same methods certain will cast more light on the extent of the anomalies in the facial skeleton, but a more uniform material than those used by Gilley and Graber would be preferable. As was pointed out by Fogh-Andersen,[2] complete cleft lip and palate differs genetically from simple cleft palate and these two types of anomalies should not be treated as one. The unilateral and the bilateral complete cleft probably have similar etiology. In the bilateral complete cleft cases, however, the premaxilla is separated from the lateral parts of the upper jaw, and surgical intervention in the nasal septum area can cause an entirely different influence upon the development and position of the premaxilla when compared with unilateral complete cleft cases. In profile investigations of subjects who have undergone surgical treatment, a confusion of these two types of anomalies easily may lead to misunderstandings.

The unilateral complete cleft palate differs from other types of harelip and cleft palate by a more pronounced asymmetric form of the upper jaw, especially in the alveolar process and the dental arch. That part of the upper jaw which lies on the cleft side may be regarded in most cases as the most abnormal or underdeveloped. This important detail does not appear in profile analysis by the usual methods.

With most patients, the difference between the alveolar process on the two sides is so great that, as a matter of course, it may be characterized as pathologic. However, we do not know the conditions of the supporting structures which lie between the alveolar process and the base of the cranium. The manifestation of the unilateral complete cleft shows there is a certain difference in the development of the two sides, and the question is whether this difference is of as much importance in other parts of the facial skeleton as in the palate and the alveolar process. In addition, the surgical closing of the lip and palatal cleft results in the formation of a scar which increases the symmetry aberrations in the alveolar process to the extent that the teeth on one side may be out of function. There is, therefore, the possibility that the contraction of scar tissue may cause an asymmetry in the facial skeleton outside the alveolar process and the unilateral mastication may have a certain influence on form development.

If we could trace the symmetry aberrations in the facial skeleton in these cases, and compare them with normal conditions, we would be able to trace the extent of the anomaly in the facial skeleton. In an investigation such as this, however, it is not possible to get a complete picture of the extent of the anomaly, since a series of functions, namely respiration, speech, swallowing, and mastication, occur abnormally. These abnormal functions influence both sides of the facial skeleton. In addition, the appearance of the cleft at an early stage of

embryonic development may cause serious disturbances that will influence the development of the upper facial skeleton in its entirety. This part of the malformation can be disclosed only by a study of the dimensions of the skull in height, length, and width.

A group of sixty-seven children were studied for symmetry aberrations in the facial skeleton. Forty-four of these patients were in the 7- to 14-year age group. Before the study was commenced, a method had to be developed which gave precise information about the symmetrical construction of the facial skeleton in living material. The result was the so-called x-line method which can be described in this way: on the posteroanterior roentgenogram, the lateral parts of the zygomatico-frontal sutures were marked and a horizontal line was drawn between these two points. Another vertical line representing the median plane was drawn at right angles to the horizontal line through the root of the crista galli (Figs. 1 and 2).

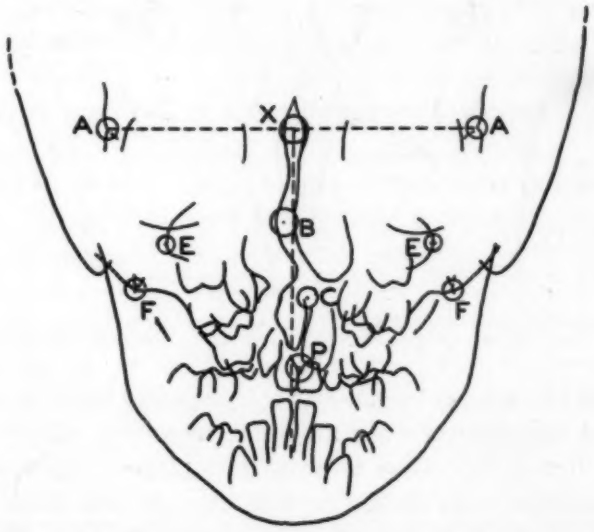


Fig. 1.—Drawing from a posteroanterior roentgenogram of a patient with complete unilateral cleft palate. Forehead-nose projection. *A*, The lateral limit of the zygomatico-frontal suture (fmt); *X*, the root of the crista galli; *B*, the most displaced part in the middle third of the osseous nasal septum (sept.n.); *C*, the intermaxillary suture near the anterior nasal spine (ns) (the location is difficult in complete unilateral cleft palate cases); *E*, the lateral wall of the maxillary sinus (sin.m.); *F*, the inferior limit of the zygomatico-maxillary suture (zm); *P*, the inferior limit of the intermaxillary suture in the alveolar process (pr).

Findings show that in normal cases the anterior nasal spine was very close to this median line. In more than 90 per cent of the cases the anterior nasal spine was found to be less than 1.5 mm. from the x-line, and when the distances were measured on both sides from the temporal border of the zygomatic bone, and from the zygomatico-maxillary sutures on the malar processes to the x-line, the index of symmetry obtained in this way closely corresponded to anthropologic findings. It was possible with the aid of x-ray films to register asymmetries within the facial skeleton with a considerable degree of accuracy (Table I). This method of analysis then was used to record variations of symmetries in normal living material and special asymmetries which appear in con-

nection with unilateral total cleft palates. The first group was characterized as normal with regard to the upper facial skeleton when the alveolar process and the teeth were excluded. This exclusion meant that no special pathologic condition had to be considered. The condition of the teeth varied considerably in these normal patients from perfect sets of teeth to rather severe malocclusions. The symmetry aberrations of the temporal line of the zygomatic bones were registered on x-ray pictures taken in a posteroanterior projection. The chin and nose were resting against the "bucky." The head was tilted backward showing the zygomatic bones on the x-ray above the base of the skull (Fig. 2).

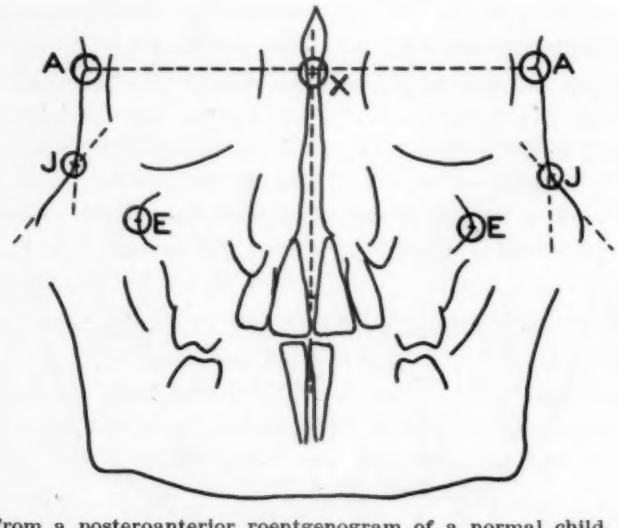


Fig. 2.—Drawing from a posteroanterior roentgenogram of a normal child. Chin-nose projection. *j*, The lateral border of the zygomatic bone. (For other symbols, see Fig. 1.)

The distance from the lateral border of the zygomatic bone, between the frontal and the temporal processes, to the x-line, is measured on both sides and the difference between the two sides is seen in relation to the total width. No pathologic asymmetries were found in this area of the facial skeleton in the

TABLE I. THE DIFFERENCE BETWEEN THE MEASUREMENTS OBTAINED FROM THE RIGHT AND LEFT SIDES OF THE MAXILLA EXPRESSED IN PER CENT OF THE SUM OF THE TWO MEASUREMENTS*

MATERIAL	NUMBER OF INDIVIDUALS	RANGE OF VARIATION (PER CENT)	MEAN (PER CENT)	STANDARD ERROR OF THE MEAN	STANDARD DEVIATION
Skulls	49	−3 to +2	.19	±.15	1.03
Posteroanterior x-ray films of skulls	49	−2 to +4	.07	±.13	.93
Posteroanterior x-ray films of children aged 7 to 14 years	19	−1 to +1	.15	±.17	.75
Posteroanterior x-ray films of individuals aged 15 years and over	27	−2 to +3	.44	±.25	1.32

There is no correlation between the symmetry aberrations obtained from the skull material and from the x-ray pictures of these skulls. The range of variation of these symmetry aberrations is very limited and of no significance to the deformity in complete unilateral cleft lip and palate cases. The symmetry aberrations observed on x-ray pictures of normal children are within similar limits.

*The anthropologic landmarks used are NS, and Zm. The landmarks on the x-rays are Zm and the x-line (Fig. 1).

TABLE II. THE SYMMETRICAL POSITION OF THE LATERAL BORDERS OF THE ZYGOMATIC BONES IN RELATION TO THE X-LINE (jũ., FIG. 2)

CONDITION	AGE (YEARS)	NUMBER OF INDIVIDUALS	RANGE (PER CENT)	MEAN (PER CENT)	STANDARD ERROR OF THE MEAN	STANDARD DEVIATION	STANDARD ERROR OF METHOD (PER CENT)
Normal	3 to 6	11	−2 to +4	.8		1.57	.556
	7 to 14	31	−2 to +3	.62	±.188	1.05	.556
	15 —	82	−3 to +3	.25	−.132	1.20	.556
Complete cleft on left side	7 to 14	23	−2 to +4	1.46	−.283	1.36	.556
Complete cleft on right side	7 to 14	21	−2 to +3	.63	±.257	1.18	.556

The symmetry aberrations in the cleft palate groups are within the normal range of variation. An examination of nine cases below the age of 7 years, and fourteen cases above the age of 15 years also indicate similar findings.

group with complete unilateral clefts (Table II). The lower medial borders of the zygomatic bones at the zygomatico-maxillary suture (Fig. 1) were also found in a normal symmetrical position in relation to the x-line (Table III) in the cleft lip and palate cases. The lower part of the zygomatic bone at the key ridge may be moved 1 to 1.5 mm. medially when a severe scar contraction is present in the lip and palate. This movement, however, is not significant.

TABLE III. THE SYMMETRICAL POSITION OF THE MOST INFERIOR POINT OF THE ZYGOMATICO-MAXILLARY SUTURE (zm., FIG. 1) IN RELATION TO THE X-LINE

CONDITION	AGE (YEARS)	NUMBER OF INDIVIDUALS	RANGE (PER CENT)	MEAN (PER CENT)	STANDARD ERROR OF THE MEAN	STANDARD DEVIATION
Normal	3 to 14	19	−1 to +1	.15	±.172	.75
	15 —	27	−2 to +3	.44	±.254	1.32
Complete cleft on left side	3 to 14	18	−1 to +4	1.56	±.39	1.65
Complete cleft on right side	3 to 14	9	−3 to +2	−.56	±.63	1.89

The slight difference in the symmetry aberrations between the two cleft palate groups indicates that the presence of the malformation might have a certain modifying influence on the positioning of the suture. However, it is of no significance when seen in relation to the deformity within the maxilla.

In the majority of the individuals the difference between the two sides is less than 2 per cent of the total width. There is no difference, in this respect, between normal cases and cases of complete unilateral cleft lip and palate. The forward positioning of the zygomatic bones in relation to the external auditory meatuses is also normal in these cases (Table IV). This indicates that the position of the zygomatic bones is normal in spite of the severe malformation in the maxilla and the palatine bone.

TABLE IV. THE SYMMETRICAL ANTERIOR POSITION OF THE ZYGOMATIC BONES IN CASES WITH COMPLETE CLEFT ON THE LEFT SIDE

NUMBER OF INDIVIDUALS	RANGE (PER CENT)	MEAN (PER CENT)	STANDARD ERROR OF THE MEAN	STANDARD DEVIATION	THE ERROR OF THE METHOD S.
21	−1.7 to +1.7	−.05	±.1	1.15	.52

The measurements are taken from the external auditory meatus to the most anterior point on the contour of the facies temporalis of the zygomatic bone as seen on x-ray pictures taken in a submental-vertical projection (the Frankfort plane is parallel with the film). The data reveal no abnormalities.

Within the maxillary bone, the maxillary sinuses were found to develop normally in a lateral direction, even though nasal stenosis on the cleft side is a frequent finding. The size of the sinuses indicates that the corpus maxillae cannot be influenced to any significant degree under these conditions (Table V). Pathologic asymmetries in the sinuses were traced in only those parts which extend into the alveolar process and the palatine process. In the lateral segments of the alveolar process, severe pathologic asymmetries were traced, of course, especially in the lower anterior part.

TABLE V. THE DIFFERENCE BETWEEN THE RIGHT AND THE LEFT MAXILLARY SINUSES WHEN MEASURED FROM THE X-LINE TO THE LATERAL LIMIT OF THE SINUSES (sin.m. FIG. 1)

CONDITION	AGE (YEARS)	NUMBER OF INDIVIDUALS	RANGE (PER CENT)	MEAN (PER CENT)	STANDARD ERROR OF THE MEAN	STANDARD DEVIATION
Normal	3 to 6	11	−4 to +7	1.05	±1.02	3.37
	7 to 14	31	−6 to +7	1.07	± .443	2.47
	15 —	82	−5 to +7	.83	± .257	2.31
Complete cleft on left side	7 to 14	23	−8 to +6	.99	± .715	3.43
Complete cleft on right side	7 to 14	21	−8 to +5	−.11	± .652	3.0

Marked symmetry aberrations of the sinuses are frequent. There is no difference between the groups. Therefore, the presence of the deformity may have only an insignificant modifying effect on the development of the sinuses in the lateral direction.

In the mid-section of the facial skeleton the condition is less favorable. The nasal septum invariably has an abnormal form, and the premaxilla is always out of its normal position (Tables VI and VII). In complete unilateral cleft cases the premaxilla is displaced to the opposite side of the cleft with the

TABLE VI. THE DEVIATION OF THE MIDDLE THIRD OF THE NASAL SEPTUM (sept. n., FIG. 1) FROM THE X-LINE MEASURED IN MILLIMETERS*

CONDITION	AGE (YEARS)	NUMBER OF INDIVIDUALS	RANGE	MEAN	STANDARD ERROR OF THE MEAN	STANDARD DEVIATION
Normal				1)		
	3 to 6	11	−2 to +2	.36		1.3
				2)		
	7 to 14	31	−3 to +3	.61	±.25	1.4
				3)		
	15 —	82	−5 to +5	.83	±.22	1.99
Complete cleft on left side				4)		
	7 to 14	23	−7 to +2	3.3	±.41	2.02
Complete cleft on right side				5)		
	7 to 14	21	+1 to +5	2.9	±.39	1.77

$$t = \frac{\bar{x}_2 - \bar{x}_4}{SE_{\bar{x}_2 - \bar{x}_4}} = 8.14 > 2.58$$

$$t = \frac{\bar{x}_2 - \bar{x}_5}{SE_{\bar{x}_2 - \bar{x}_5}} = 4.21 > 2.58$$

The degree of deviation is usually marked. The characteristic feature is the direction of deviation.

*Values are positive when deviation is to the right.

TABLE VII. THE DEVIATION OF THE INTERMAXILLARY SUTURES IN THE PREMAXILLA (ns., FIG. 1) FROM THE X-LINE MEASURED IN MILLIMETERS*

CONDITION	AGE (YEARS)	NUMBER OF INDIVIDUALS	RANGE	MEAN	STANDARD ERROR OF THE MEAN	STANDARD DEVIATION
Normal						
	3 to 6	11	−2 to 0	1) .36		.67
	7 to 14	31	−2 to +3	2) .10	±.16	.87
	15 —	82	−4 to +2	3) .0	±.12	1.08
Complete cleft on left side	7 to 14	23	0 to +8	4) 3.3	±.21	1.02
Complete cleft on right side	7 to 14	21	−6 to −0	5) −4.0	±.30	1.39

$$t = \frac{\bar{x}_2 - \bar{x}_5}{SE_{\bar{x}_2 - \bar{x}_4}} = 12.16 > 2.58$$

$$t = \frac{\bar{x}_2 - \bar{x}_5}{SE_{\bar{x}_2 - \bar{x}_5}} = 12.04 > 2.58$$

In the majority of the cleft lip and palate cases the symmetry aberrations are pathological. Similar findings were observed in the age groups 3 to 6 years, and over 15 years.

*Values are positive when deviation is to the right.

alveolar process tilted against the mid-line (Fig. 1). In complete bilateral clefts the basal part of the premaxilla, that is, the anterior nasal spine area, remains closer to the x-line and is more pronounced anteriorly, whereas the alveolar process is directed inferiorly and posteriorly (Table VIII).

TABLE VIII. THE POSITION OF THE ANTERIOR NASAL SPINE EXPRESSED BY THE ANGLE BETWEEN THE FRANKFORT PLANE AND THE LINE N.NS

NUMBER OF INDIVIDUALS	TYPE OF CLEFT	AGE RANGE (YEARS)	MEAN AGE (YEARS)	ANGLE: F_p − N.NS			
				RANGE	MEAN	STANDARD ERROR OF THE MEAN	STANDARD DEVIATION
35	Complete unilateral on left side	2 to 15	8.5	80° to 93°	1) 88.7°	±.644	3.82
27	Complete bilateral	3 to 15	9.0	85° to 105°	2) 93.25°	±.94	4.64

$$t = \frac{\bar{x}_1 - \bar{x}_2}{SE_{\bar{x}_1 - \bar{x}_2}} = 6.53 > 2.58$$

There is a significant difference between the groups, showing that the anterior nasal spine is more prominent in cases with complete bilateral cleft.

In the alveolar bone of the premaxilla, the buds of the permanent incisor teeth frequently are found in an irregular position having an abnormal direction of eruption.

These findings may be summarized in this manner. The deformity of the facial skeleton is localized mainly in the alveolar and palatal processes of the lateral parts of the maxilla, and also in the mid-section, that is, in the nasal septum and the premaxilla.

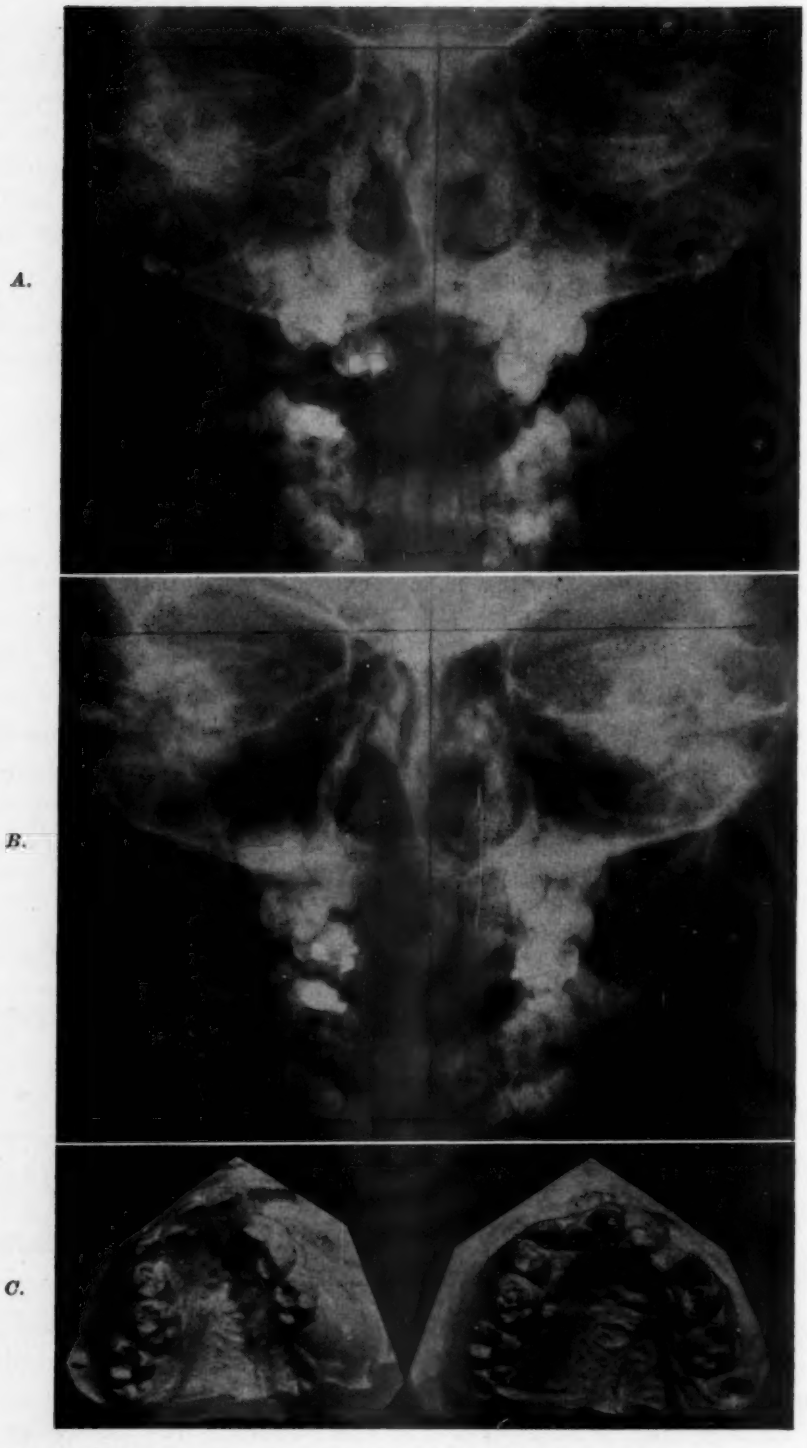
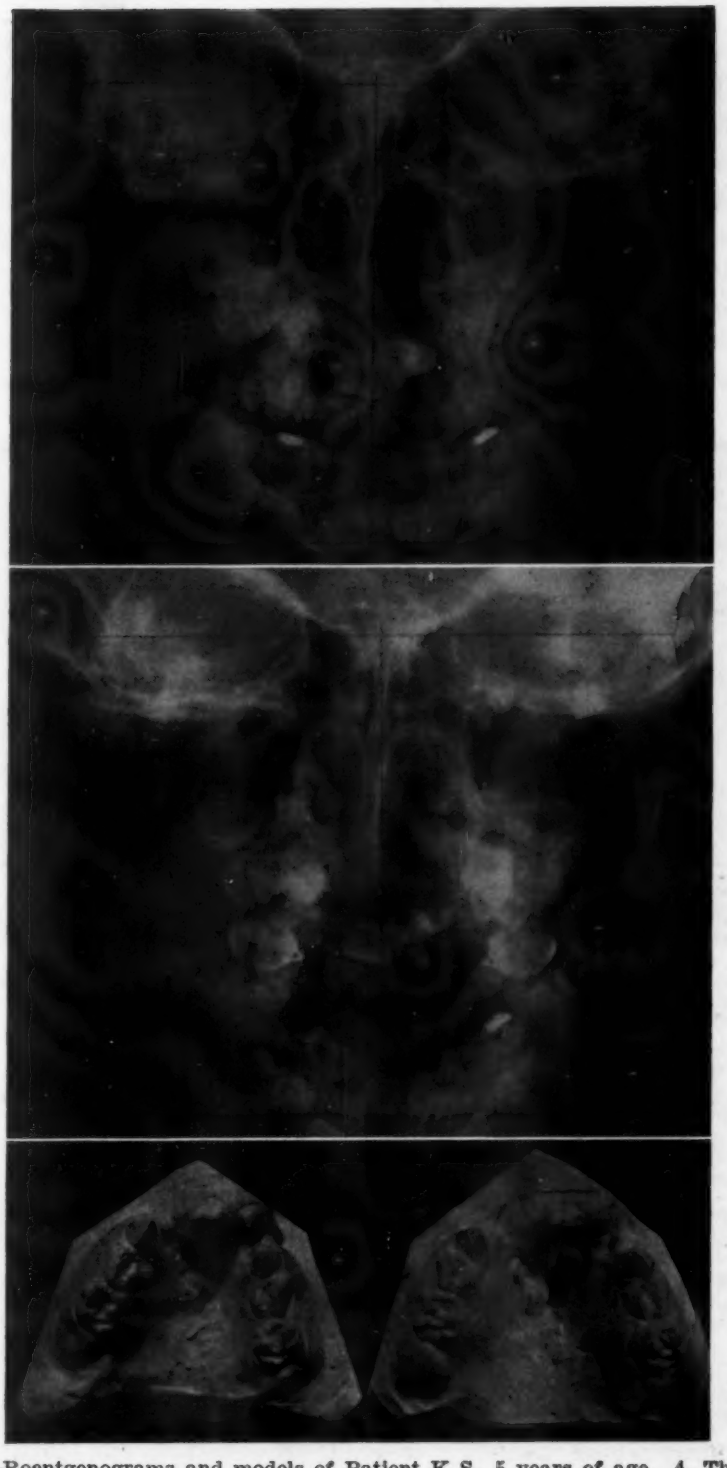


Fig. 3.—Roentgenograms and models of Patient G. M., 5 years of age. *A*, Pathologic asymmetries in the alveolar part of the maxilla. On the side of the cleft the deciduous teeth, as well as the unerupted permanent teeth, are displaced medially. *B*, The repositioning of the lateral segment of the maxilla on the cleft side has brought erupted, as well as unerupted, teeth into normal symmetrical position. The premaxilla remains in abnormal position. *C*, Changes in the dental arch accomplished by repositioning of the maxillary bone during five months of treatment.



A.

B.

C.

Fig. 4.—Roentgenograms and models of Patient K S., 5 years of age. *A*, The lateral segments of the maxilla are displaced medially, resulting in a bilateral cross-bite. *B*, The repositioning of the lateral parts of the maxilla has brought the erupted, as well as the unerupted, teeth into normal relationship to the lower dental arch. *C*, Changes in the dental arch as a result of the repositioning of the maxillary bone. The forces applied to the teeth during the four months of treatment cause only an insignificant amount of tooth movement in the alveolar process.

Further studies have shown that the narrow dental arch frequently can be corrected by a repositioning of the displaced parts of the maxilla. If this is accomplished before the permanent teeth have completed their eruption, the alveolar process will develop normally except in the cleft area.

Fig. 3, *A*, *B*, and *C* shows x-ray films and models of a characteristic case with complete unilateral cleft lip and palate before and after the repositioning of the maxilla. There is no significant alteration in the distance between the zygomatic bones or the lateral limits of the maxillary sinuses. The width of the lower part of the nasal cavity is increased, especially in the anterior region. The distance between the corresponding tooth buds on the two sides is also

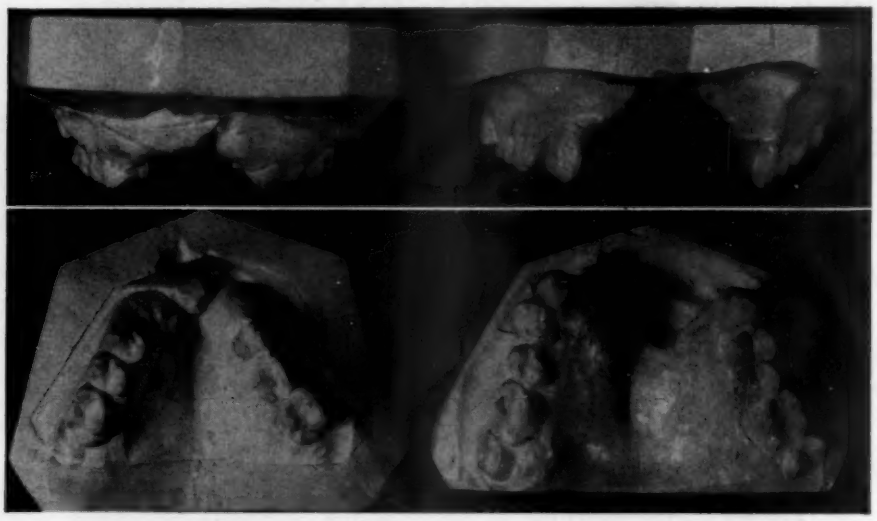


Fig. 5.—Increased arch width and alveolar height following treatment from ages 12 to 14 years. Note the altered relationship between the remaining part of the premaxilla and the teeth in the lateral segments.

enlarged. Fig. 4, *A*, *B*, and *C* shows similar alterings in a case with complete bilateral cleft. The remaining openings in the soft tissues in the palate will increase in size during this treatment, but, because of proliferation along the margins, they subsequently will diminish. The widening of the palate also may enable a surgical closure of the remaining openings. This repositioning of the maxillary bones, to obtain normal tooth eruption and vertical growth in the alveolar process, should be considered a basic principle in the treatment of the cleft lip and palate cases. The repositioning of the bones can be accomplished at any time up to the age of 25 years, and probably later. Vertical growth in the alveolar process, however, is associated with the eruption period. If the eruption of the teeth in the lateral segments of the maxilla is studied, it is evident that the canine, which normally is guided downward and forward by the lateral incisor and the first premolar, often will be impeded in its eruption by the presence of the cleft. Otherwise, the growth potential in this area seems to be unaffected (Fig. 5).

In the normal premaxilla, the deciduous central incisors and the permanent incisors are erupting inferiorly and anteriorly. In the cleft lip and palate

cases the alveolar process is forced posteriorly by the lip, and the permanent tooth buds frequently point downward. When it is possible to counterbalance the lip pressure and move the incisors into a more normal direction of eruption,

A.

B.

Fig. 6, *A* and *B*.—At 8 years of age the central incisor on the cleft side is impacted in the palate. There is very little alveolar bone between the cleft and the intermaxillary suture. The repositioning of the maxillary bone and the guidance of the erupting central incisors are followed by changes in the alveolar process which permit the movement of the impacted central incisor into the arch.

the alveolar process will develop more favorably (Fig. 6). The lateral displacement of the premaxilla in unilateral cleft cases, the pronounced anterior position in cases with bilateral clefts, and the frequency of abnormal teeth in this area are, however, features which require further study.

The conclusion which may be drawn from these studies is that the major part of the deformities seen in the cleft lip and palate cases cannot be due to reduced growth potentials. The narrow dental arches may be attributed to a change in maxillary bone position and a concomitant inhibition of vertical alveolar growth. The abnormal tissues in the mid-section of the facial skeleton, that is, the nasal septum and the premaxilla, which occur early in fetal life, have established an inconsistent pattern of growth and development, but later alterations in environment also will modify this pattern. It should be our objective to learn to control this environment and attain a growth pattern as close to normal as possible.

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SOME VIEWPOINTS ON EXTRACTION

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"Give us the courage to accept with equanimity the things in life which cannot be altered. Give us the strength to alter those things which can and should be altered, and give us the wisdom to distinguish between the two."—*Townsend.*[1]

PURPOSE

THE purpose of this article is to present a composite of views, experiences, and facts relative to the judicial extraction of teeth in the treatment of malocclusion. The theme pervading is most suitably expressed in the words of Nance,[2] who said "Orthodontic treatment, therefore, consists of repositioning teeth in proper alignment and normal occlusion insofar as there is adequate bony support to permit it." Since it is clearly indicated to most of us that extraction of teeth frequently plays a part in orthodontic therapy, it seems fitting, and perhaps worthy of some interest, to gather up the more pertinent factors in order to gain a clearer view of the role of extraction, and to assist in developing a basis for the more rational differential perception of the need for extracting teeth while analyzing, diagnosing, and planning treatment for our cases.

HISTORY

This article is intended to reflect the evolution of the role which extraction of teeth plays in present-day treatment methods for many orthodontic cases. There have been extractions in attempts to "straighten crooked teeth" for centuries, but it does not seem particularly profitable to give further mention to such methods of treatment, which existed in the days before orthodontics became recognized as a science and was accepted as a field outside the bounds of general dentistry.

Suffice it to say that Angle and Case[3] represent the period that first evidenced the most scientific approach to what was then the problem of extraction in orthodontics. In view of the fact that Angle's influence and teachings held more popularity, the views of Case were stifled for many years. As Fairbanks[4] put it: "The integrity of the dental units . . . dominated the thinking and action of the dental profession. Perhaps no one factor was responsible for so many failures among honest and conscientious orthodontists."

Submitted in partial fulfillment of the requirements for the Certificate of Competence in Orthodontics at the University of Tennessee, College of Dentistry, Memphis, Tenn.

Angle's[5] contention that bone could be made to grow was based upon Wolff's[6] law, which referred to changes in form being associated with changes in function but which interpretation was misunderstood to say that increase in size resulted from increase in function.[7] According to Keith,[8] this was amplified by a Chicago surgeon, Dr. J. B. Murphy, who said: "The amount of growth in a bone depends upon the need for it."

One might assume from this that Angle is being ridiculed and belittled. Nothing could be further from the truth. This great man had courage, strength, and wisdom enough to place orthodontics on its own feet and the ability to set those feet into motion. He brought this specialty out of a chaotic state and, by example, he has been, and will continue to be, responsible for the inspired contributions of other great men in orthodontics who seek improvements and new knowledge. Although some of his teachings and concepts have been disproved, those teachings and concepts served as stepping-stones and not steps in the wrong direction. Newcomb[9] had this in mind when he said, "Some have long felt that orthodontic progress has been impeded by . . . the domination which Angle exercises to this day. Let it be recognized here that this domination was and is more of a weakness in ourselves than a fault of his."

Following the heated discussions that Case's views created, however, extraction was scorned for thirty years by nearly all, except such men as Lundstrom,[10] Grieve,[11] and Stanton,[12] who, though recommending extraction in cases where the bony support was limited, received little or no support from their fellow orthodontists. It was not until Tweed[13] presented his mass of clinical evidence that a general change in thinking was brought about. Change, indeed, it was, and the ground is still shaking!

Although Tweed deserves the credit for awakening widespread attention to the value of extracting teeth as an adjunct to treatment, mention must be made of another great development that has had such a vast effect upon orthodontic progress: cephalometric roentgenography. The roentgenographic cephalometer[14] has been the greatest gift to orthodontics since Angle's classification of malocclusion, and has reshaped the future of the profession because of its development. The role of extraction is only one of many orthodontic problems that has been clarified by the cephalometer, and its value has not yet been fully realized.[15]

OBJECTIVES OF TREATMENT

Before going further into this consideration of extraction, let us be sure that we have our objective clearly fixed in mind. We are all agreed that our desire is to judiciously restore the teeth in a given mouth to the utmost in efficiency, longevity, harmony, beauty, and stability. The number of teeth that will remain in the mouth after treatment is relatively inconsequential. To quibble over the extraction of a "sound" tooth usually is presumptuous, for the very fact that these untreated malocclusions with crowded, disarranged teeth, in presenting themselves to us for treatment, testifies that

possibly the entire dentition is unsound so long as they remain untreated. This is not to say that the maximum number of teeth possible to be retained in a treated mouth—thirty-two—is not to be desired. On the contrary; but, that number must not be in defiance of our objectives just listed. It is obvious that no one would recommend extractions if it were not thought necessary.

The integrity of the dentition, then, is not to be considered, per se. It is the appraisal of the inherent factors of the case and the diagnosis which will or will not indicate the reduction of dental units. Before this is thoroughly made, opinions on the case regarding extraction, or any other phase of treatment, should be avoided. The treatment planning may offer a reconsideration of the advantages or disadvantages of extracting teeth for the treatment and, finally, the prognosis of the case can either substantiate or disprove the advisability of extraction.

THE APPRAISAL AND DIAGNOSIS

All orthodontists are familiar with the broad concepts of jaw and facial growth. Wise use of this knowledge, however, requires that it be applied appropriately in evaluating the feasibility of extracting teeth as much as considering all the other factors pertinent to the case.

Brodie[16] has shown that the growth pattern, once formed during the first year, does not change throughout the life of an individual. In normal patterns, the growth vector is downward and forward. In abnormal patterns, growth may take a different direction, but will continue in that direction as a permanent course.

Massler and Schour[17] have demonstrated that postnatal growth of the face occurs by deposition of bone on the alveolar borders, the sutures giving length and width in the maxilla, plus a small bit of surface appositional growth. Appositional growth of bone in the posterior borders of the rami of the mandible, with resorption on the anterior surfaces, is apparent. Proliferation of cartilage with bone replacement in the mandibular condyles is important in the downward and forward growth of this bone. Increase in width of the mandible occurs as a result of the V-shaped backward growth of the rami. In 1937, Brodie, Downs, Goldstein, and Myer[18] proved conclusively that the only portion on this bony growth that could be affected by orthodontic therapy is the alveolar process.

In the vast majority of orthodontic cases, there is a discrepancy between the size of the jaws and teeth, or between the sizes of each jaw, or a combination of the two. Berger[19] has set forth these possible causes for this discrepancy:

1. *A Pathologic Basis.*—Where disease or injury has dwarfed the growth of the jaws.

2. *A Constitutional-Hereditary Basis.*—Inheritance of large teeth and small jaws, or vice versa.

3. *A Phylogenetic Basis.*—The evolutionary transition from the massive Neanderthal jaws to the much smaller jaws of modern man has been much greater in proportion than the transition of the sizes of teeth.

Evolution has reduced the size of the jaws, but has not reduced the size of the teeth. In cases where there is more tooth material than bone, reduction in tooth material must be undertaken. However, the diagnosis will determine in just what manner this discrepancy exists.

Brodie[20] cautions against a hasty presumption of an insufficiency of bony structure for all the teeth, and advances the observation that ". . . the rate of eruption and growth in each individual may have many varying possibilities in their relation to each other. Also, the magnitude of disharmony in each case may range from easy to difficult to judge." He later concedes, however, that in instances where the tooth eruption rate is ahead of the growth rate, and the teeth lack space for proper positions, extraction usually is considered.

Salzmann[21] mentions alveolar prognathism, as distinguished from true facial, or basal, prognathism by Bjork,[22] to be one of the primary factors in determining the desirability of extraction. Alveolar prognathism is designated as being a protrusion of the dental arch beyond the basal bone of the jaws, and may exist with or without true basal prognathism, the latter of which is a prominence of the bony structure of the face in relation to the brain case.

Von der Heydt[23] has gone a little further with a differentiation of alveolar prognathism that exhibits Class II, Division 1 characteristics. He designates four types of maxillary protrusion:

1. *True Maxillary Protrusion.*—Maxillary alveolar prognathism, with a good mandibular arch form.

2. *Maxillary Protrusion With Mandibular Insufficiency.*—Maxillary alveolar prognathism, and a mandibular condition that is on the border line between an alveolar prognathism and a crowded arch form, with a Class II molar relationship not clearly defined.

3. *Potential Maxillary Protrusion.*—Maxillary blocked-out teeth with good mandibular arch form.

4. *Mandibular Displacements.*—Functional displacement of the mandible; the relation improves when the mandible is in rest position. In these cases occlusal grinding usually corrects the relations.

Von der Heydt also touched upon Class I cases that fall into the realm of prognathism. These he differentiated as the classical bimaxillary protrusion, and the potential bimaxillary protrusion, which exhibits the usual characteristics of Class I cases—crowded arches, high canines, and inadequate bony support for all the teeth present. Von der Heydt's use of the word "potential" has reference to a condition that would exist if the arches were expanded to accommodate all the teeth present in their respective arches.

In considering the integration of growth, Tweed,[24] in normal as well as abnormal occlusions, uses the Frankfort mandibular plane angle to reflect the

vector of the growth pattern, and thereby, in cases of malocclusion, determines the deviation from the normal which any particular case manifests. Bjork[22] achieves a similar evaluation, but it is expressed in terms of a disproportion in the various parts of the facial structure (jaws) and the cranial base, and says: "Analysis has shown that the relation in size and position of the jaw is a significant factor in the occurrence of differential prognathism in the jaws. In some cases one jaw may be exceptionally long in relation to the other jaw, while in other cases the sizes may be proportionate, but the relative positions may vary owing to the *shape of the cranial base.* Usually both factors occur in combination, either assisting or counteracting each other."

In correlating the findings of Tweed and Bjork, one can translate Bjork's basilar disproportions into terms of angles by substituting the cranial base for Tweed's Frankfort plane, allowing the increased angular difference between the cranial base and the Frankfort plane before measuring the angle of incidence with the mandibular plane. The rationale of this lies in the thinking that, in any given case, the cranial base plane or the Frankfort plane would have the same angular relationship with the mandibular plane due to the fact that both sella and porion are parts of the cranial base.

The clinical significance of either the angular values or the definition of the disproportions or deviations for each and every case is to indicate, particularly if cephalometric films are used, the limitation imposed by the growth pattern and relative positions of the jaw bases, and hence serve to evaluate the chances for successful treatment.

This viewpoint ties in with the more recent work of Thompson, Graber, and Donovan,[25] at Northwestern, who have worked out a practical and systematic means of analysis using cephalometric radiographs in conjunction with casts, photographs, and intraoral films. From the use of cephalometric films, one can evaluate the growth pattern, the trend of growth in relation to the cranial base, the facial type, the evaluation of the vertical height and the freeway space, the relationship of the maxilla to the mandible, the relationship of each of these jaws to the cranial base, and the relationship of the teeth to the cranial base, the basal bones, the facial plane, and to each other.

This is a lot of information, which can be perceived very readily and quickly when the systematic tracings of a few easily discernible points and landmarks are made from the films. Since the brain case is 85 per cent of its adult size at 5 years of age, and almost completely developed at age 10, the cranial base is considered more stable, and hence is used as a plane of reference for measurements in preference to the Frankfort or any other plane. In addition, it is more reliably located for this purpose.

The cranial base-mandibular plane angle, Graber[25] says, can have a very wide range within normal limits, and so is not considered the most reliable of criteria in obtaining a skeletal and a denture appraisal. Rather, the angle of the cranial base with the measure point on the skeletal profile, which identifies the juncture of the maxillary basal bone with the alveolar bone (acceptably designated as point A, and the angle as SNA), is preferred and

found to be more stable and to have more diagnostic value. A corresponding angle then is constructed to the same measure point on the mandible (designated as point B, and the angle as SNB). Thus, each of the angles SNA and SNB can be measured, and the difference obtained is used to designate the relationship of the maxilla to the mandible. This difference in angular values thus derived then can be compared with the Table of Means set up by Reidel, which is a compilation of the mean SNA-SNB differences for each classification of malocclusion, and the normal; in this manner a basis can be established for judging the difficulty which will be encountered in adjusting the occlusion, and maintaining the integrity of the relationship of the teeth to basal bone.

Thus, we can expect the effects of our treatment, as has been mentioned previously,[18] to be restricted to change in the positions of the teeth and alveolar process; moreover, the mutual positions of the basal bones cannot be altered beyond what may be regarded as normal growth change during the course of treatment[18, 26, 27] or the change in movement in the temporomandibular articulation that can be produced by a mandibular displacement.[27-29] Concomitant with cephalometric appraisal, study of casts, photographs, and intraoral films, such factors as growth trend, facial type, basal bone to cranial base relationship, disproportion between maxillary and mandibular basal bone, inclinations of teeth, relationship of teeth to facial plane, and size of teeth, singly and collectively, will dictate which teeth, if any, are to be extracted. There will be neither the justification nor the occasion, when extraction is indicated, to question whether a tooth, or teeth, should be "sacrificed." George Dinham[30] attempted to settle this question when he said, "A reduction in the number of teeth to make possible an approximation of normal . . . position is no more a compromise than the retention of thirty-two teeth, with abnormal . . . position and possible collapse as the end result. Either both procedures are compromises, or neither is."

TREATMENT PLANNING

Downs[31] has said, ". . . many of our difficulties in treatment can be directly attributed to excessive disharmony of the skeletal pattern. A recognition of such limitations forewarns the orthodontist of what he may expect if he undertakes treatment. It is much more comforting to recognize this before starting a case than to find out after months of treatment that you are not getting the nice results that other cases produce." It might be well to say that it is comforting to recognize the limitations of a great number of orthodontic cases, whether the limitations be due to skeletal disharmony or other basic factors.

The limitations imposed by the musculature are illustrated by Salzmann[21] in his description of Seipel's closed functional system of the jaws, which is described as existing between the jaws, teeth, and the muscles of mastication. This system exhibits a mechanical balance of pressure and contrapressure through the arrangement of muscles, bone, and dentition. It begins with the

dentition, goes through the trajectories of the maxilla to the base of the skull and the adjacent muscular insertions, from whence it goes back through the muscles of mastication to the mandible, and from there through the mandibular trajectories (the structural arrangement of the Haversian system, through which stresses generated by the dentition are transmitted), completing the chain at the dentition. This closed functional arrangement limits the areas in which the orthodontist can place the teeth in his attempts to eliminate malocclusion, and to round out or expand the arches enough to bring them into conflict with this system results in collapse.

Strang[32] has said, ". . . there is no question in my mind that denture expansion as a treatment procedure in the correction of malocclusion should be discarded and every effort made toward preserving the muscular balance that is the most important factor in establishing and maintaining tooth positioning."

Nance[2] has found that the greatest permanent increase in the outside measurement that has remained stable after treatment was 2.6 mm.; less than one-half the average width of the smallest permanent tooth. The purpose of discussing these factors at this point is to illustrate the occasion where some borderline cases may have been appraised as being amenable to treatment without extraction, but in which, upon planning treatment, the extremely narrow limits of stability subsequent to treatment might indicate extraction after all.

Sometimes, in formulating a plan of treatment, the choice of extracting first or second premolars is not readily certain. Nance[2] has this to say about the question: "In treatment, after one removes first premolars, the six anterior teeth are pitted against the second premolars and molars. Accordingly, the removal of first premolars is good practice when mesial movement of the buccal teeth is to be minimized. On the other hand, when the second premolars are removed, mesial movement of the molars is pitted against the first premolars plus the six anterior teeth, and thus mesial movement of molars is facilitated. It is upon this basis that one should decide to remove first or second premolars."

In his report on results of cases treated that involved extraction of teeth, Cole,[33] working with Brodie, found that closure of spaces thus created predominately involved anterior movement of the molars in 50 per cent of the cases, and posterior movement of the incisors in 25 per cent of the cases; the remaining 25 per cent gave equal movement to both segments. Incidental with the forward movement of the posterior segment, Cole observed that the extraction cases showed a tendency to bite closure in 62 per cent of those treated, presumably due to the fact that the forward positioning of the molars allowed greater closure of the jaws before the molars came into occlusion. A bite plate on the maxillary retainer would alleviate this condition.

Nance[2] observes that undesirable consequences of treatment in which extraction has played a part occur all too frequently. However, he places the blame, usually, not upon the extraction, but upon the plan of treatment

that was used following extraction. Weber[34] cautions, too, about the extraction of a mandibular incisor, upon which occasion the overbite is likely to be increased following the rearrangement of the remaining anterior teeth. In those instances where an increase in overbite would be desirable, however, he withdraws the application of caution in this regard. Martinek[35] has mentioned a similar instance in which open-bite cases would not tolerate the added injustice of moving molar teeth posteriorly, but, rather, premolar extractions and subsequent movement anteriorly of the molars would be preferred in order to gain some bite closure.

Admittedly, there are pitfalls in extracting teeth in conjunction with orthodontic therapy; great care and rational appraisal of each malocclusion must be exercised to circumnavigate them. There is no doubt that the last ten years have seen a rather promiscuous upsurge in the removal of teeth in the attempt to correct malocclusions, but it is also evident that the latter part of this decade has witnessed a decrease in the promiscuity, with a proportionate increase in the rational approach to, and the acceptance of, the role of extraction in many cases of successful orthodontic therapy. To quote Lowrie J. Porter[36]: "... it must be emphasized that successful treatment obtained by extraction will only result if, following extraction, a very definite technique is used to close all spaces, with the adjacent teeth in upright positions. *It is not an easy way out.*"

SUMMARY

1. To the majority of orthodontists, extraction of teeth is accepted as an adjunct to good orthodontic therapy in a sizeable percentage of malocclusions that are presented for treatment.

2. The primary consideration in treating malocclusions is to restore the mouth to the maximum in efficiency, longevity, harmony, beauty, and stability.

3. These maximal qualities, when achieved through orthodontic therapy, then would exemplify an occlusion most normal for any individual, regardless of the ultimate number of teeth remaining in the mouth.

4. The decision to extract teeth for the individual case is based upon the following:

A. The findings in careful analysis and diagnosis; particularly with evaluations of (1) growth pattern; (2) growth trend; (3) relation of the bony bases to the cranial base; (4) relation of the bases to each other; (5) relation of the axial inclination of teeth to the facial plane or cranial base; (6) relation of the anterior teeth to the facial plane in horizontal linear measurement; (7) positions and relations of the individual teeth and to each other; (8) size of teeth and jaws; (9) spacing, crowding, lack of teeth, or superfluity of teeth; and (10) vertical height, overbite, and free-way space.

B. The plans for treatment of the individual case, which should be taken into consideration, are: (1) the limitation of the particular

case as determined in the analysis; (2) the choice of teeth that are to be extracted; and (3) the necessity for proper positioning and aligning of the remaining teeth, and closure of all spaces if the limitations permit.

5. Thorough analysis and diagnosis, and treatment planning, can be most efficacious through the use of cephalometric radiography in conjunction with casts, photographs, and intraoral films.

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STONE AGE MAN'S DENTITION

With Reference to Anatomically Correct Occlusion, the Etiology of Malocclusion, and a Technique for Its Treatment

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(Continued from the June issue, page 462.)

UNIVERSAL TOOTH MOVEMENT WITH THIN ROUND STAINLESS STEEL ARCH WIRE

The last part of this article gives a technique for controlled universal tooth movement by the use of round heat-treated 0.018-inch diameter stainless steel arch wire with vertical spurs bent into it for producing buccolingual and labiolingual bodily tooth movements.

Modified ribbon arch bracket bands are used with spurs soldered to the bands mesially or distally to the brackets. These band spurs are employed to obtain extra arch wire leverage for producing mesiodistal bodily tooth movements.

This technique does not differ from that used with Angle's pin and tube, ribbon arch, and edgewise arch mechanisms in basic mechanical principles and procedure, although the motive force is derived from an arch wire of different alloy, size, and shape.

Compared with the gold-platinum edgewise arch, this resilient thin round steel arch exerts less than one-half the force but operates over a much greater range of tooth movement. Therefore, since it conforms more to optimum requirements for tooth movement, it produces tooth movements much more quickly and with less inconvenience to the patient and the operator.

Examples are given of cases treated by this technique.

Before tooth removal for orthodontic purposes became so commonly practiced as it is now, the tendency of the teeth (especially the anterior teeth) to tip outward as the dental arch with its full complement of teeth was expanded orthodontically, was not so detrimental to the success in treatment attained in those days as was generally supposed.

Often this uncontrollable labial and buccal tipping was an unsuspected advantage, for it prevented damage to the periodontal membrane and bone;

it also prevented denuding of the teeth labially of bone as a result of these teeth being moved bodily too far forward.

Although the edgewise arch mechanism was specially designed to prevent undesired tooth tipping, that is, to move teeth bodily, the fit of the arch in the brackets becomes loose from wear and tear so that the rigid control necessary for bodily tooth movement is lost. To overcome the disadvantage of this loosening, that is, to obtain more torque to continue with bodily tooth movement, frequent compensatory rebending of the arch is necessary.

G. H. Terwilliger,[11] in a recent publication, has mentioned this need for frequently putting compensatory bends in the edgewise arch as its fit in the tie brackets loosens.

In 1928, when I first started extracting the four first premolars, this loosening became a serious disadvantage, as it permitted the incisors to tip lingually instead of moving back bodily to fill the extraction spaces. To prevent this lingual tipping, and thereby to avoid the need for frequent arch removal, I, for the first time in 1929, used to solder four spurs about 0.050 inch in length, at right angles to the gingival surfaces of the upper and lower edgewise arches. These arch spurs were soldered on in such positions that, when the arches were tied into the tie brackets, the free end of each spur pressed back against the labial surface of each incisor gingivally to the bracket. Thus, bodily movement of incisors was made easier.

The vertical arch spurs on the edgewise arch gave me the first idea of a technique for obtaining universal tooth movement with a thin round stainless steel arch wire instead of an edgewise arch. This round arch technique is described later in this article. There are no individual or mass tooth movements, as employed in the Tweed technique, which cannot be accomplished with this thin round steel arch wire.

We are indebted more to the late Dr. E. H. Angle than to anyone else for inventing appliances for controlled universal tooth movement, for changing of arch form, and for gaining tooth positions of textbook ideal occlusion. His appliances, the pin and tube, ribbon arch, and the edgewise arch mechanisms, were peculiarly adapted in both size and shape for exploitation of the physical properties of gold platimum arch wire, as this alloy was at that time the best available metal for arch wire.

Since Dr. Angle's appliances were invented, stainless steel has become available for arch wire. Stainless steel is so much more powerful and rigid when made in such large dimensions as the edgewise arch that it is unsuitable. However, when heat-treated cold-drawn stainless steel is used in the form of thin round arch wire of 0.018 inch diameter, many properties superior to those of platinized gold are revealed.

It delivers light gentle force over a long range of distance, so that frequent taking off and reshaping of arch wire is unnecessary. Perhaps this property of remaining almost free from permanent distortion when sprung over relatively long distances gives thin stainless steel arch wire its chief superiority over platinized gold arch wire.

Stainless steel is at its optimum efficiency for arch wire when it is thin in cross section compared with platinized gold arch wire.

The need for using such thin stainless steel arch wire presents difficulties of accurately and rigidly harnessing it to the band brackets for universal tooth movement. However, it seems that if an attempt were made to harness sufficiently thin stainless steel arch wire for universal tooth movement by making it up into miniature edgewise arch form and using correspondingly small tie brackets, the small bearing surface of the arch in the bracket would result in the arch soon operating, in effect, as a thin round arch because of frictional wear.

To exploit the superior properties of heat-treated steel for universal tooth movement, I use a single round arch wire 0.018 inch in diameter with appropriately placed vertical spurs on it (Figs. 15, 16, 17, and 18).

This thin arch is used in conjunction with Angle ribbon arch bracket bands with the arch seating slot of the bracket reduced buccolingually in size to fit the arch wire, and with the lock pin slots of the brackets broader mesiodistally so that stouter lock pins can be used. However, when the arch is required to slide freely mesiodistally through the brackets, smaller lock pins are used.

Also, round stainless steel spurs (Figs. 15, 16, 17, and 18), 0.030 inch or more in thickness and about 0.050 inch high, are soldered to the bands at a distance of about one-sixteenth of an inch mesially or distally to the brackets, as required.

The spur is situated at the same horizontal level as the arch-seating floor of the bracket, so that, if the arch is passively locked in the bracket, the arch rests passively on the spur.

The spur, soldered to the band, serves the same purpose as the Angle ribbon arch cleat, which used to be soldered to the arch.

If desired, the spur may be placed further gingivally than the level of the arch-seating floor of the bracket to do away with the need for putting bends in the arch for bodily tooth movement.

This spur makes possible the accomplishment of mesial and distal bodily tooth movements with the round arch, and it also can be used to prevent mesial and distal tipping of teeth.

In effect, this spur, in conjunction with the bracket, produces the equivalent of a bracket-seating length of much greater mesiodistal width than the tie bracket and makes possible a greater utilization of the wide range of spring of thin steel arch wire.

The practice I previously employed of having two ribbon arch brackets soldered side by side, but some distance apart, on a band has been discarded almost entirely in favor of the spur and bracket, as there is not enough space between the two brackets to accommodate the vertical arch spur.

For bodily labial, buccal, and lingual tooth movements, the thin steel arch wire is bent to form vertical spurs (Figs. 15, 16, 17, and 18).

Fig. 15.

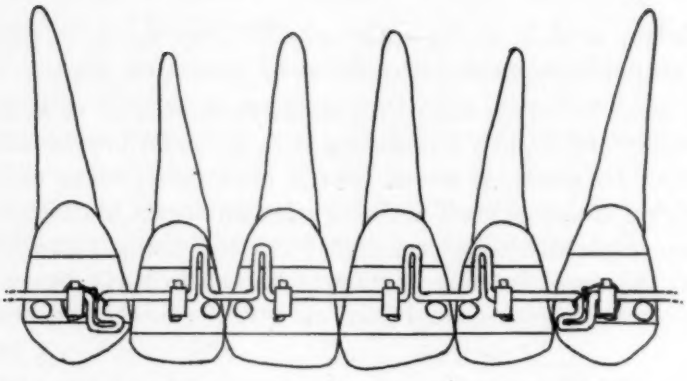


Fig. 16.

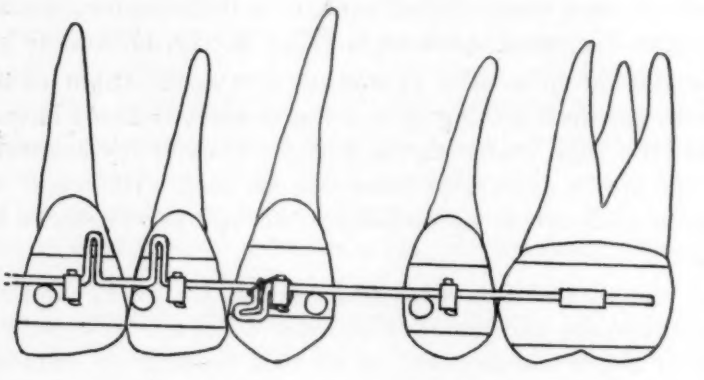
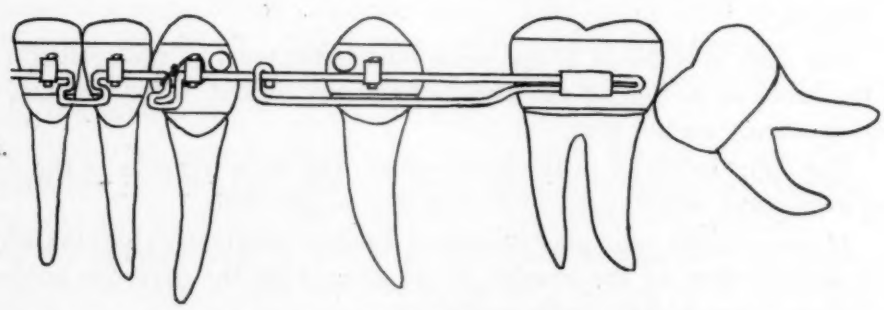


Fig. 17*A*.



Figs. 15, 16, and 17A.—Method for using 0.018-inch diameter round stainless steel arch wire for universal tooth movement.

Fig. 17*B*.—To show unerupted impacted lower third permanent molar, with a staple cemented into it, being moved occlusally and distally, while the twelfth year molar is being moved mesially in a mouth from which $\frac{6,4\,|\,4,6}{6,4\,|\,4,6}$ have been extracted prior to orthodontic treatment.

These arch spurs are placed so that they engage the teeth as near to the centers of their labial or buccal surfaces as the ribbon arch brackets will allow.

The spurs extend at right angles from the main line of the arch wire and are bent to press against the tooth surface gingivally for producing root movements in the lingual direction, and they project occlusally from the arch wire if it is necessary to produce root movements in the labial and buccal direction.

Although the round arch wire is only 0.018 inch in diameter, these arch spurs give it a flat occlusocervical-bearing surface often four times greater than this diameter.

Fig. 17*C*.

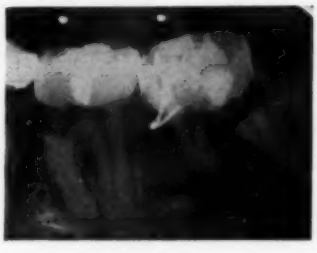
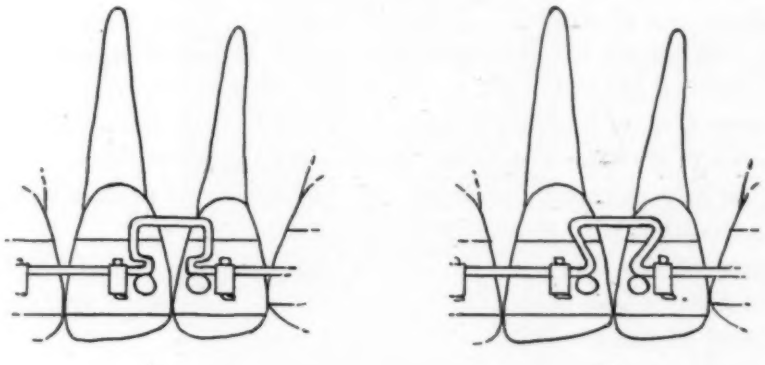


Fig. 17*D*.

Fig. 17*C* and *D*.—Later stages where banding of this third molar has been possible. Also note that the twelfth year molar has been moved right forward to be in contact with the second premolar.



A. *B*.

Fig. 18.—Variations of the arch bent vertically for bodily tooth movement.

It is found that universal tooth movement can be produced with thin round stainless steel arch wire by using the previously described vertical arch spurs together with the spurs soldered to the bracket bands.

We have, therefore, a mechanism of similar mechanical principle to pin and tube appliances, giving controlled tooth movement in three planes of space, which is even simpler to operate than the edgewise arch mechanism.

Although Dr. Angle's pin and tube appliance was his most mechanically sound invention for controlled universal tooth movement, it was discarded because of the great difficulty of constructing it and because of the difficulties of seating the arch in position.

Heat-treated thin stainless steel wire cannot be soldered or welded without making it so soft that it is useless for tooth movement. Therefore, all

auxiliaries, such as the previously described arch spurs, the intermaxillary hooks for elastics, stoppers, expansion, and contraction loops, are bent into the arch instead of being soldered to the arch. This bending can be done just as accurately as soldering, and in much less time.

Of course, the changing from one technique to another is a great undertaking and would deter many who do not conceive of the advantages of more fully exploiting the superior properties of thin heat-treated stainless steel arch wire for universal tooth movement. However, those well versed in the use of the edgewise arch mechanism should find no difficulty.

The basic principles and methods of tooth movement and treatment, generally, are the same, whether the edgewise arch mechanism or this steel wire technique is used.

While becoming proficient in this technique, the final accurate placement of the teeth in occlusion may be accomplished after removing the round steel arch by using a platinized gold ribbon-shaped arch.

My main reasons for using ribbon arch brackets, instead of tie brackets, are: (1) rotations of teeth can be carried out without using eyelets; (2) the narrowness of ribbon arch brackets leaves plenty of space on the labial and buccal surfaces of the teeth for the vertical spurs on the arch wire to bear against the teeth; (3) the arch is held right against the tooth bands by ribbon arch brackets and allows the vertical arch spurs to be in contact with the teeth along the full length of the spurs, as also are the lugs, stoppers, and hooks; and (4) with this thin arch wire, the locking of the arch in the brakets is easy to do, whereas, if tie brackets are used, ligature wires cannot be tied properly when spurs and stoppers are touching the sides of the brackets.

It is largely the use of ribbon arch brackets that makes universal tooth movement possible with thin round steel wire.

Because of the difficulty of reducing the extreme linguoclination of the incisors in many Class II, Division 2 cases, these constitute perhaps one of the hardest types of cases to treat.

The arch torque force, which can be exerted by the vertical arch spurs, makes simple the correction of this Class II, Division 2 incisor linguoclination.

When these vertical arch spurs are used, a torque that operates over a wide range of tooth movement can be bent into the arch so that there is no need to take off the arch several times during treatment to rebend it.

Again, these vertical arch spurs can be employed to obtain firm en masse anchorage of the lower anterior teeth for resistance to intermaxillary elastic force. The arch spurs, of course, are then pointing up incisally on the lower incisors. Wherever labial, buccal, or lingual bodily tooth movement is required these arch spurs can be employed.

Now that such strong lock pins are available, the arch openings of the ribbon arch brackets are used pointing gingivally. Therefore, if the band spurs are soldered on at a level more to the gingival than the arch seats of the brackets, it is unnecessary to put tip back bends in the arch wire. Thus, the arch can be left straight during treatment.

Also, if the molar tubes are soldered on at an oblique angle, the molars can be tipped back with a straight arch at the same time.

Its great range of spring makes the thin steel arch suitable for the straight arch method of bodily tooth movement.

The great resiliency of this steel arch is perhaps the chief quality that makes it suitable for treating patients with eight teeth extracted, as the thin steel arch operates over such a wide range of tooth movement without having

Fig. 19.

Fig. 20.

to be reshaped. The great distances over which teeth have to be moved after eight teeth are extracted present no serious difficulty, because these distances are almost entirely mesiodistal in the soft cancellous alveolar bone.

Formerly, however, in the nonextraction era of arch expansion in orthodontics, moving teeth bodily out into anatomically wrong positions through the hard, dense cortical plates of the jawbones was difficult and prolonged.

Figs. 19, 20, 21, and 22 show a case which, with extraction of the four sixth year molars and the four first premolars, has been treated by means of the thin round steel arch technique.

Radiographs taken before extracting the sixth year molars showed the presence of the four developing third molars. The lower third molars were

Fig. 21.

Fig. 22.

tipped so far mesially in their crypts that they would not have erupted without later orthodontic treatment.

At the age of 15¼ years, which was more than two years after completion of active treatment, the four third molars had come almost completely into occlusion. Fig. 22 shows, at a later date, the third molars erupted into occlusion.

Although, in this case, no meticulous care has been taken to attain precision of occlusal relations, axial inclinations, and rotations of the posterior teeth, the attention paid to the more important and vital problems of harmonizing the amounts of tooth and bone, keeping the teeth in the cancellous centers of the tooth-bearing parts of the jaws, paying attention to anteroposterior tooth relationships, and bringing the remaining posterior teeth well forward in the jaw account for the stability of the occlusion achieved.

Fig. 23.

Fig. 25.

Fig. 24.

Fig. 26.

Fig. 23.—Note narrowness of lower arch.
Fig. 24.—See text.
Fig. 25.—Note how much lower arch has been broadened by comparing with Fig. 23.
Fig. 26.—See text.

Figs. 23, 24, 25, and 26 show a case also treated throughout by the round steel arch wire with arch spurs and band spurs. Only the four first premolars were extracted, as radiographs showed that the two upper third molars were congenitally absent. The two lower third molars have been extracted.

Fig. 27.

Fig. 28.

Fig. 29.

Fig. 30.

Fig. 31.

Fig. 32.

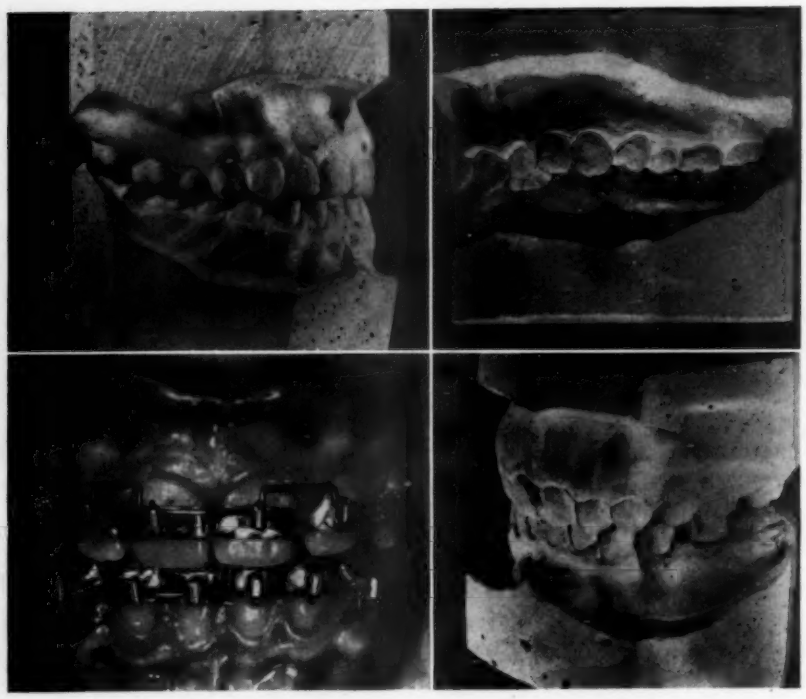


Fig. 33.

Fig. 34.

Figs. 27, 28, and 29 show a Class II, Division 1 case originally treated, after extracting only the upper first premolars, in 1930 when the patient was 11 years old. At that time, I did not realize the importance of sufficiently reducing the total amount of tooth substance. The anterior teeth were not taken back far enough on the alveolar ridges at the first attempt to treat the case. Fig. 28 shows the condition in 1947 before further treatment was undertaken. The upper sixth year molars and the lower first premolars were extracted immediately before fitting the appliances. After completion of this second treatment, which took seven months, the lower third molars were extracted.

Figs. 30 and 31 show a Class III case treated with the thin steel arch.

Figs. 32, 33, and 34 show a Class II, Division 2 case also treated with this steel arch.

ARCH-FORMING TECHNIQUE AND DESCRIPTION OF THE PROPERTIES OF THE ARCH WIRE, BAND MATERIAL, AND SOLDER

Before using this round steel arch method, I used the edgewise arch mechanism to treat many cases involving extraction of the previously mentioned eight teeth. Therefore, it may be seen that I do not intend to imply that no technique other than that of the thin round steel arch can be used for these extreme cases.

However, it has been found that the properties of this thin, hardened, stainless steel arch wire make it superior in many respects for treating extraction cases.

The gold platinum edgewise arch is susceptible to distortion by mastication where it spans the first premolar and sixth year molar extraction spaces, but the steel arch is seldom affected in this way.

I am greatly indebted to A. J. Wilcock for bringing the 0.018-inch diameter steel arch wire to its present standard; also for experimenting to produce nickel chrome orthodontic bands, aluminum bronze alloy ribbon arch brackets, buccal tubes, brass lock pins, silver-cadmium solder, and fluoride flux.

Standard round arch wire is cold-drawn down to a diameter of 0.018 inch. This operation plays some part in hardening it.

The processes of heating and cold-drawing are done alternately until the wire attains its desired properties. Also, special treatment is given the wire to eliminate the skin effect which is produced during the drawing.

It is necessary to heat at specified intervals during the reduction of diameter, depending upon several factors including the diameter of the raw material, the analysis and the diameter of the finished wire.

Heat treatment is used to relieve stresses in cold-worked austenitic chromium nickel steels and to improve their tensile elastic properties. The heat treatment improves the proof stress or yield point, and after this treatment the yield point figure is from 10 per cent to 20 per cent higher than untreated wire.

The yield point for stainless steel is generally very close to the tensile strength, whereas in platinized gold this yield may be 25 per cent below the tensile strength.

When treated in this way, the steel wire may be bent without breaking when formed into the required spurs, hooks, and lugs. When in use, it seldom breaks at the places where it has been bent.

However, the 0.018-inch arch wire is so hard that it often breaks if an attempt is made to straighten out the sharper bends.

If made up in diameters greater than 0.018 inch, it is so brittle that quite often it breaks when bent to form the auxiliaries into it.

As there is no available reliable published information comparing heat-treated platinized gold wire with heat-treated stainless steel wire, H. K. Worner, Professor of Metallurgy at the University of Melbourne, has recently tested and finds that 0.018-inch diameter round heat-treated standard stainless steel wire exerts an orthodontic force about three times greater than heat-treated platinized gold wire of the same diameter, and is much more resilient than the gold platinum wire.

Storey and Smith[12] have recently shown that the optimum force for moving canine teeth is 150 to 200 Gm. and that it produced rapid continuous movement. However, 400 to 600 Gm. force causes anchor teeth to move, and there was initially very little or no canine movement. Then, movements of anchor teeth stopped and rapid cuspid movements started.

From these experiments, it is easier to understand why the gentle force of the 0.018-inch round arch wire moves teeth much more rapidly than the edgewise arch.

During preparatory arch-forming and bending, advantage is taken of the great distance the arch can be sprung without reaching the critical point of permanent distortion.

It is important that the main line of the arch is not put out of alignment while the various spurs and hooks are formed. To avoid this, the arch is kept in a straight line while these bends are put into it. It is the resiliency of the arch that makes it possible to keep it in a straight line while performing this operation.

The technique used to form the arch is to commence arch-forming at the distal end of the last banded tooth of the left side.

A piece of arch wire is threaded through the molar buccal tube until the desired amount of it projects distally through the tube.

If a spur, loop, or stopper is required at the mesial end of the tube, the distal point for placing any such auxiliary is gripped by the thin-beaked bending pliers, and the arch is then taken out of the mouth for this stopper to be bent into it.

The arch is then, if this is possible without arch distortion, sprung into the bracket for the second premolar and also into the first premolar bracket if this tooth is present, and then also into the cuspid bracket. Any arch spurs required along this section are bent into the arch before proceeding further.

Mesial to this cuspid bracket, the correct point for bending the intermaxillary elastic hook is gripped by the pliers and the arch is again removed from the mouth for bending this hook into the arch at the gripped point on the arch.

Proceeding from left to right, the same method of forming the auxiliaries into the arch is used all the way around until the distal end of the right side of the arch is reached.

If a slight bend is accidentally made in the main line of the arch at any stage of the process of arch-forming, it is immediately straightened out before proceeding any further with the arch-forming.

In order that it will not be unavoidably bent into a curve at any point of its formed length, the arch is not made to engage the molar buccal tube and premolar brackets of the left side while the incisor region of the arch is being formed. At this stage it is engaged only into the left cuspid bracket.

Similarly, while forming all the right side of the arch, it is not engaged into the incisor brackets, but only as far forward as the right cuspid bracket.

When sixth year molars are extracted, a flat molar buccal tube is used on the twelfth year molar band. This buccal tube is made large enough to hold two thicknesses of the arch wire with a fit so loose that the double arch can slide freely through it.

The arch wire is then doubled back and fashioned as in Fig. 17.

This doubling back of the arch makes bodily movement of molars easier. It also prevents the pull of intermaxillary elastics from tipping the molar.

As the distal end of the arch slides too far distally through the molar buccal tube, a new arch must be made.

When this arch-forming technique is properly carried out, all the auxiliaries should project from the straight arch exactly at right angles to the labial-buccal plane of the arch. Therefore, the ideal to be aimed at is that, if the straight arch is then placed on a flat glass slab, it and all of its auxiliaries will be touching the slab throughout the entire length of the arch wire.

Even while bending the vertical arch spurs lingually to the required angle for exerting torque force, the main line of the arch wire is still kept in a straight line. Two pairs of wire-bending pliers, one pair in each hand, are required for thus bending back the vertical arch spurs.

Next, the straight arch wire, with all its auxiliaries bent into it, is formed to the required arch curve by trial in the mouth.

Following this step, tip back bends are made where required in the arch and it is then ready for applying to the teeth.

Before using this arch with vertical spurs, extensive imbrications, rotations, or spacing of the teeth are first corrected by the use of the thin steel arch wire without spurs, but with expansion or contraction loops where required.

The physical properties of this arch wire make possible the use of as many as four long, thin expansion or contraction loops bent into the arch wire between the brackets on neighboring teeth.

The only reason for bending auxiliaries into this arch is that it seems to me to be the only way, at the present time, to make the superior properties of heat-treated thin stainless steel wire available for controlled universal tooth movement.

I use nickel chromium alloy pinch bands of varying thicknesses and widths as required for molars, premolars, and anterior teeth. These bands are made by soldering the ends of the formed bands together, instead of spot welding them.

Light-colored copper cement is used for cementing on bands, as it is stronger and lasts longer than zinc phosphate cement.

Nickel chromium pinch bands are used because they are tougher, more ductile, and less brittle and their edges are less likely to split than stainless steel bands. High ductility and malleability permit precious metal tooth bands to stretch and loosen under masticatory stresses, but nickel chromium bands withstand these stresses

After trying for several years, A. J. Wilcock has supplied solder which most strongly, easily, and simply solders this nickel chromium band material. In my experience, it also just as readily solders stainless steel, aluminum bronze, gold, and its alloys. For soldering gold alloy orthodontic arches and bands for molars, premolars, and anterior teeth, it is superior to any available solders specially made for their soldering. To obtain satisfactory results, it must be used with the flux which is described below. This is the lowest flow point solder that is satisfactory when used on stainless steel. It is a silver solder containing cadmium but no tin.

The flux is a mixture of three parts potassium bifluoride and two parts boric acid.

This mixture is ground up to a thick paste and then oven-dried, broken up again, and oven-dried. This process is repeated until a final mixture has been achieved which, when ground to a powder, will remain in a dried state when bottled.

Too high an oven temperature will destroy some of its properties and a brown-colored mixture will result.

When this flux is ground up with pestle and mortar with a small quantity of water, it will produce the best results with stainless steels.

Further diluted with water, it is suitable for ordinary soldering processes on precious metals or bronze alloys, provided the previously described strong low-fusion solder is used.

The superior properties of the solder seem to be chiefly due to its cadmium content.

I wish to thank A. J. Wilcock who has experimented for years to produce the stainless steel arch wire, brackets, lock pins, nickel chromium band material, solder, flux, and jigs for soldering brackets and spurs to bands until these materials are now of such a standard that they can be used in the ways described in this article.

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170 NORTH TERRACE.

Editorial

The Golden Anniversary of the American Association of Orthodontists

IN THE year 1901 Dr. Edward H. Angle, in conjunction with Dr. Richard Summa, at St. Louis, Missouri, conceived the idea of organizing a small group who were interested in the study of a new specialty of dentistry called orthodontics. Just a handful of men organized this group and they called it the American Association of Orthodontists. Dr. Edward H. Angle was elected the first president.

Four years later the fourth annual meeting of that society was held at the Stratford Hotel, Chicago, Illinois, on Sept. 28, 29, and 30, 1905. The officers were: president, Lloyd S. Lourie, Chicago, Illinois; vice-president, R. Ottolengui, New York, New York; secretary, Anna Hopkins, St. Louis, Missouri. A few high spots on the program follow.

The First Superior Molar As A Basis of Diagnosis in Malocclusion. Edward H. Angle, St. Louis, Missouri.

Heredity As An Etiologic Factor in Malocclusion. Martin Dewey, Kansas City, Missouri.

A Few Thoughts Concerning The Teeth And Their Osseous Base. Richard Summa, St. Louis, Missouri.

Orthodontic Problems of the X-Ray. Varney E. Barnes, Cleveland, Ohio.

Art in Model Making. Alfred P. Rogers, Fall River, Massachusetts.

Normal Occlusion vs. Normal Dental Relation. Herbert A. Pullen, Buffalo, New York.

Duplication of Models. Walter H. Ellis, Buffalo, New York.

Contrast Between The Old and New School of Orthodontia. Frederick S. McKay, St. Louis, Missouri.

The Influence of Inheritance on Malocclusion. William J. Brady, Iowa City, Iowa.

Dr. Axel Lundstrom, Goteborg, Sweden, was another essayist on that program (subject not recorded).

Dr. Lloyd S. Lourie, who was a charter member of the organization, was president and leader of that fourth annual meeting in Chicago.

Dr. Lourie, Dr. Willard Flint of Pittsburgh, Pennsylvania, and Dr. Walter Ellis of Buffalo, New York, attended that meeting in Chicago and were also present fifty years later at the Golden Anniversary Meeting of the American Association of Orthodontists, held at the Palmer House, Chicago, Illinois, May 16 to 20, 1954. The fiftieth meeting was outstanding. The

attendance (1,006) proved to be the largest of any meeting ever held during the entire fifty odd years that have elapsed since that first meeting in St. Louis in 1901, just previous to the St. Louis World's Fair.

Under the direction of President James Ford and his capable and loyal committees, the fiftieth meeting went off with a dispatch and perfect timing that reflected the careful thought and coordination that only good cooperation can produce.

The Palmer House, with its wide experience and efficiency, did itself proud and eliminated all the usual reservations snarl that is so characteristic of conventions everywhere in America.

In a word, the "City on Lake Michigan" again did its stuff and contributed much to the success of the meeting.

The American Board of Orthodontics met the previous week. The Publication and Editorial Boards met Sunday morning and the Board of Directors also held its first session on Sunday morning. Sunday evening came the informal buffet dinner. This was followed by the annual stag dinner on Monday night, presided over by William R. Murray of Evanston, Illinois. The following day the Golden Anniversary Luncheon, presided over by Charles R. Baker of Evanston, Illinois, paid tribute to the old-timers who had been in practice fifty years or more.

Tuesday the annual International Luncheon was held, presided over by Andrew F. Jackson of Philadelphia, honoring Oren A. Oliver of Nashville, Tennessee, who is president of the Fédération Dentaire Internationale. Also present were Harold Hillenbrand, Chicago, Illinois, Secretary of the American Dental Association, and Nathaniel Livermore, nationally known speaker. Dr. Brooks Bell of Dallas, Texas, presided over the Past Presidents' Luncheon, and it was there that the discussion took place about the coincidence of one of the charter members of the Association, and its fourth president, making the journey clear from California to attend this Fiftieth Anniversary meeting.

Dr. Walter Ellis of Buffalo then provided the printed formal programs of the 1904 meeting at Chicago and also the program of the Twelfth Annual Meeting held at the Hotel LaSalle in 1912. (Milton T. Watson of Detroit was president of this 1912 meeting.)

The ladies' entertainment was outstanding and provided a happy sojourn in Chicago for the wives of orthodontists and their friends.

A digest of the formal program follows:

Invocation by The Rev. Edward J. Mullaly was followed by the welcome of Allan G. Brodie and response by President-Elect Frederick T. West. The President's Address was given then by President James T. Ford. Monday morning's program included a paper, "A Simple Technique Showing the Mesial or Distal Movement of the Maxillary Molars," by the 1955 Ketcham Award recipient, Joseph E. Johnson. This was followed by another paper, "Relation of Orthodontic Disturbances to Masticatory Function," by R. S. Manly of Boston, Massachusetts.

The Monday afternoon program included "Symposium On The Temporomandibular Joints" by John R. Thompson and Harry Sicher of Chicago.

William S. Brandhorst of St. Louis, Robert W. Donovan of Chicago, and Robert M. Rickets of Pacific Palisades, California. At 4:30 came the presentation of the Albert H. Ketcham Memorial Award to Charles R. Baker by the president of the American Board of Orthodontics, Raymond L. Webster. This presentation is the classic and ceremonial event of each and every meeting of the American Association of Orthodontists.

On Tuesday "Facial Growth and Its Clinical Importance in Orthodontics" was presented by Alton W. Moore of Seattle. Then came "The Effect of High Kilovoltage on Hard and Soft Tissue Definition in Lateral Cephalometric Roentgenograms" by J. B. Franklin of Milwaukee, Wisconsin, and "A Radiographic Cephalometric Study of Changes Associated With Orthodontic Treatment of Selected Cases" by Waldo O. Urban of Evanston, Illinois. "Own Your Own Office and Investments and Economics" by Everett Hunt and Vernon L. Hunt of Eureka, California, attracted wide attention, not only because it was well presented, but also because it was something new on the A. A. O. programs.

Wednesday opened with "Orthodontic Specialization Within The British National Health Service" by Alexis W. Eastwood of London, England. This was followed by "Selective Grinding—An Integral Part of Orthodontic Therapy" by Albert G. Heimlich of Santa Barbara, California, and "Ways of Appraising Modern Methods of Analysis in Terms of Common Office Experiences and Observations" by J. William Adams of Indianapolis, Indiana.

Wednesday afternoon featured general clinics and the research meeting. The President's Reception was followed by a banquet with professional and orthodontist participation entertainment. The banquet will be reported elsewhere in the JOURNAL in a separate run-down.

Thursday morning's session opened with a panel on "The Treatment of the Deciduous and Mixed Dentition" by the following: Leuman M. Waugh, New York, New York, Moderator; George W. Hahn, Berkeley, California; S. J. Kloehn, Appleton, Wisconsin; and H. K. Terry, Miami, Florida.

Of considerable interest was "An Exhibit of Case Reports by Twenty of the Thirty-Five Diplomates Certified at the 1953 Examination" conducted by the American Board of Orthodontics.

To get back to the theme of Chicago meetings, the program of 1912 reveals some interesting things. The subject, for instance, of "Occipital and Cervical Anchorage" was responsible for a paper by Carl B. Case, and was discussed by Frank Casto and Frederick S. McKay. That subject was presented once more at the Palmer House during the 1954 meeting—forty-two years later. The discussion was much the same, and again it has been revealed that history repeats itself, even in a very new specialty.

Bernarr MacFadden, the well-known physical culture expert, read a paper on the subject of the influence of exercise on the development of the jaws and teeth in the 1912 meeting. Imagine, this paper was discussed by N. S. Hoff, Dean of the University of Michigan, a man who became famous because he used his jaws so little and his head so much. There was not a word in the

1912 program about the extraction of teeth. Obviously, this subject was "caput" in that era of orthodontic growth, and those who were extracting teeth were doing so more or less "under the counter."

Anyway, comparisons of the meetings held early in the century are interesting for many reasons. One reason is that orthodontists were new in dentistry and they were discussing many of the same things then, just as now. Nothing about economics is revealed in the programs of meetings held early in the century. No doubt economics was not as important then as it is today—at that time there was no income tax, and the gold standard was considered as permanent as the Rock of Gibraltar.

Now to get back to 1954. All in all, not only did the meeting enjoy the largest attendance of any ever held by the American Association of Orthodontists, but it can be said that it reflected a professional atmosphere and background that should make any orthodontist feel proud of his specialty and of the fact that he belongs to a group that has created such an outstanding specialty between 1901 and 1954. Chicago pointed up that observation.

Congratulations were heard extended by many to the officers and committees who made such a meeting possible. The following officers were installed:

President: Frederick T. West, San Francisco, California.
President-Elect: Philip E. Adams, Boston, Massachusetts.
Vice-President: George H. Herbert, St. Louis, Missouri.
Secretary-Treasurer: Franklin A. Squires, White Plains, New York.

Officers elected for the coming year were:

President: Philip E. Adams, Boston, Massachusetts.
Secretary-Treasurer: Franklin A. Squires, White Plains, New York.

The next meeting will be held in San Francisco, California, in the spring of 1955, and it is reported the entire program under the direction of Dr. Reuben Blake, Chairman, is now complete. President Fred West assures all that the meeting will live up to the highest standards.

H. C. P.

The Fiftieth Annual Meeting of the American Association of Orthodontists

THE GOLDEN ANNIVERSARY LUNCHEON

THE Golden Anniversary Luncheon of the American Association of Orthodontists was held at the Palmer House in Chicago on May 17, 1954.

This was the second year in which we have honored our A.A.O. members who graduated in dentistry fifty or more years ago. The Golden Anniversary Group totaled thirty-five last year. Nine new names were added this year, making a total of forty-four in this group, twenty-six of whom are still in active practice.

It is a great thrill for all A.A.O. members to honor these gentlemen who have been the pioneers in orthodontic thinking and progress. It is largely due to their untiring efforts that our specialty has developed to its present status.

Dr. Charles R. Baker of Evanston, Illinois, was the toastmaster for the luncheon. This was particularly fitting and most enjoyable to the very large number of A.A.O. members and guests who attended the luncheon, because Charlie was very witty and conducted the luncheon beautifully, as we all knew he would. This is just another indication of why Charlie was a very wise and most deserving choice as the recipient of the Ketham Award this year. This is the highest award given jointly by the American Association of Orthodontists and the American Board of Orthodontics for outstanding accomplishments in our specialty.

Dr. Baker introduced the fifteen members of the Golden Anniversary Group who were able to attend this luncheon and read a short history of the accomplishments of each, together with many outstanding events in their lives. He also read parts of many interesting letters he had received from those who were unable to attend the luncheon. The entire luncheon was filled with most interesting data. Space prevents quoting from all the letters and mentioning in detail all the historical facts which were presented, but I know you will be interested in a brief résumé of some of the most outstanding items.

The first gentleman introduced was Dr. Andrew F. Jackson of Philadelphia, Pennsylvania. He was the only new member who was able to attend this luncheon and was presented with the G.A.G. pin denoting his membership in the Golden Anniversary Group. It was interesting to hear that he was born in Concepcion, Chile in 1880, and that he is a member of nine medical and dental

societies and an honorary member of fifteen dental societies, including ten in foreign countries. He was the first American to receive honorary membership in the Royal College of Surgeons, of London, England. Many orthodontic papers and clinics have been given by him. His principal hobby is dramatics and he has directed more than fifty plays and has taken part in many of them. He also is a painter and "wishes he had more time for it."

Parts of letters were read from all eight newly elected members who were unable to attend the luncheon. These letters were from Drs. L. M. Christie, Washington, D. C.; Ralph T. Huff, St. Petersburg, Florida; Charles R. Jackson, LaMesa, California; J. DeWolf Jackson, San Antonio, Texas; Herbert W. Taylor, New York City; Arthur V. Greenstein, New York City; Albert E. Voss, Los Angeles, California; and, finally, from Dr. Ernest W. Patton of Birmingham, Alabama whose message reads in part as follows:

> When one is yet active and well established in practice, he feels independent and does not yearn for the sympathy of the world, but, when the evening of life approaches and they no longer seek his services on Main Street, he is inclined to feel that he is no longer needed or, perchance, not wanted. This gesture on the part of our parent body will tend to dispel that feeling and express the assurance that the oldsters are still remembered, still respected, and still loved.

That paragraph most ably expresses the feelings of those of us who have not yet reached that fifty-year class, for we respect and admire our "fifty-year men" more than they can ever know.

Golden Anniversary Group, 1954.
Top row (left to right): H. T. Berkey, H. M. Clapp, O. W. White, A. F. Jackson, W. H. Ellis, E. E. Lampert, N. C. Leonard, R. H. W. Strang, and E. W. Swinehart.
Bottom row: D. W. Flint, L. S. Lourie, B. E. Lischer, J. A. Gorman, C. R. Baker, and L. M. Waugh.

Dr. Ernest N. Bach of Toledo, Ohio, should receive all the credit for originating the Golden Anniversary Luncheon. I was highly complimented by being asked to serve on last year's luncheon committee with Drs. Bach and William

Humphrey, and again this year on the arrangement committee with Drs. Baker and Raymond Curtner. In the opinion of a great number of A.A.O. members, this luncheon is a most worthy and inspiring feature of our national convention. We sincerely hope that each year this luncheon may continue in order that new members may be introduced and be an inspiration for future achievements by not only the younger men in our specialty but for all of us who have chosen orthodontics as our lifework and our contribution to the future health and social improvement of the children of this nation.

In introducing those seated at the head table, Dr. Baker read interesting historical facts about each of those charter members who were present this year but were unable to attend the First Golden Anniversary Luncheon, as follows:

Dr. Harold Mather Clapp, Utica, New York. Graduated 1900. Joined A.A.O. about 1910. Loves to fish and hunt.

Dr. Walter Healy Ellis, Buffalo, New York. Graduated 1903. President, A.A.O. 1928. His hobby is "orthodontics."

Dr. David Willard Flint, formerly Pittsburgh, Pennsylvania; now lives in Lake Worth, Florida. Graduated 1898. President, A.A.O. 1918. Hobbies: golf and fishing.

Dr. Jacob Allan Gorman, New Orleans, Louisiana. Joined A.A.O. in 1903. Past President, Louisiana State Dental Association. Operates a boys' summer camp at Lookout Mountain, Tennessee.

Dr. Elmer Edwin Lampert, Elgin, Illinois. Graduated 1897. First office in Chicago. His hobby is also "orthodontics."

Dr. Norris Clayton Leonard, Nashville, Tennessee. (The oldest member of the A.A.O., but he still looks like a youngster and has more vitality and vigor than most of us who are many years younger. He always has a great handshake and a wonderful smile, real assets which are vital to any walk of life.) Dr. Leonard was born in 1868; graduated in 1890. Past President of the Tennessee State Dental Association and the Washington-Baltimore Society of Orthodontists. He is really active in his hobbies of inventions, motoring, and antiques.

Dr. Benno Edward Lischer, Webster Groves, Missouri (formerly of St. Louis, Missouri, and head of orthodontics at Washington University). Graduated 1900. Joined A.A.O. in 1909. President, A.A.O. in 1913; Honorary President, First International Orthodontic Congress in 1926. Hobbies: gardening, workshop, and writing, for which he has been well known throughout our specialty for many years. He is also, incidentally, a marvelous public speaker.

Dr. Robert Hallock Wright Strang, Bridgeport, Connecticut. Born 1881. Graduated in dentistry 1902, and in medicine 1904. Past President, Connecticut State Dental Association and Northeastern Society of Orthodontists. Author of many papers and of textbooks on orthodontics. Well known and highly respected teacher in orthodontics and dental hygienics.

Dr. Lloyd S. Lourie. Born 1877. Graduated in dentistry 1899. His first office was in St. Louis, Missouri, 1900 and 1901, and then in

Chicago, 1901 to 1938. He served two terms as president of the A.A.O.—in 1904, when the meeting was in St. Louis, and again in 1905, when it was held in Chicago. Dr. Lourie retired in 1938 and is now one of the few honorary members of the A.A.O. His present address is 333 15th St., Santa Monica, California.

Since Dr. Lourie is the only living charter member and founder of the American Society of Orthodontists (now the American Association of Orthodontists), he was called upon for a short talk, which was most interesting. He spoke of the many difficulties in the early days when he was a teacher in the Angle School, of his professorship in the University at 22 years of age, and of his many hardships in trying to start an orthodontic practice. His first patient was a young lady insurance agent. She gave him an insurance policy and paid the premiums for him while he "straightened her teeth." He spoke of the early days of the American Society of Orthodontists, when there were so few members that every member had to read papers, give clinics, and discuss papers at every meeting.

He mentioned a difficult period for the A.S.O. in 1905 when there was much dispute concerning the stability of the positions of the first molars. This resulted in the resignation of Dr. Angle and the formation of the Angle Alumni Association. It was questionable whether the A.S.O. would be able to continue, for Dr. Angle tried to get all of the alumni to leave the A.S.O. and join the Angle group, but we are happy to say that the A.S.O. has survived and progressed beyond all estimates of that time.

The audience arose to applaud his remarks. Now in retirement, Dr. Lourie says his hobby is salt water fishing.

Five of those seated at the head table had been introduced last year as members of the fifty-year group and their many accomplishments were noted at that time. These members, besides the toastmaster, Dr. Charles R. Baker, consisted of Drs. Hugh T. Berkey, Fort Wayne, Indiana; Earl W. Swinehart, Baltimore, Maryland; Leuman M. Waugh, New York City; and Oliver W. White, Detroit, Michigan. Dr. Swinehart is a Past President of the American College of Dentists and three of the others are Past Presidents of the A.A.O. Dr. Waugh has also just retired as president of the American Board of Orthodontics.

It thus appears that practically all the fifty-year group are men who have been active in their local, state, and national dental and orthodontic societies. This is quite a noteworthy fact for the orthodontic profession.

Dr. Baker spoke particularly about one member of the group, Dr. Oliver W. White, who, at the Ninety-seventh Annual Session of the Michigan State Dental Association, was chosen as "Michigan's Outstanding Dentist of the Year." He was signally honored "for accomplishments of great good for his profession and service to the public." Dr. White, a boyhood friend of the late Senator James Couzens, the donor of seventeen million dollars toward the Children's Fund, convinced the philanthropist that dental health should be a part of the Fund's program. Dr. Baker stated that, because of this, it is claimed that dentistry and dental health are further advanced in Michigan than elsewhere. Many activities of Dr. White were cited by the Michigan State Dental Association when it stated "The story of his life and activities is dominated by unselfish desires to

benefit his fellow men.'' Among these activities were: Director of the Dental Clinic of Childrens Hospital of Michigan since 1927; Past President of Detroit District Dental Society, Michigan State Dental Association, American Association of Orthodontists, and the American Board of Orthodontics. He was also the originator of the Detroit Dental Aid, which was created to help underprivileged children.

Notes or letters were received from every member of the Golden Anniversary Group except one. Many excerpts from these letters were read by Dr. Baker. A note from Dr. C. M. McCauley of Palm Springs, California, was written on stationery whose letterhead was as follows:

Kalotom Research Laboratory
Established in 1941 by Dr. C. M. McCauley
in Memory of Dr. G. V. Black

(NOTE: The word *Kalotom* is made from the first letters of ''Keep Alive Lessons of The Old Master.'')

The total number of years that the forty-four members of the fifty-year group have practiced is 2,303 years. That is equivalent to one man practicing since 349 B.C.

After the program, Dr. Baker asked those present to bow for a moment in silent memory of last year's charter member, Dr. William J. Speers of Winchester, Massachusetts and Dr. Henry Spenadel of New York, who was eligible for membership this year.

I could write much about the chairman, Dr. Baker, but his many outstanding accomplishments will be published in the report of the presentation of the Ketcham Award. Charlie is a grand person who has accomplished much under great difficulties, one who has been most highly honored and yet who remains very humble in every way, as is indicated by a sentence in a letter just received from him: ''I'm probably still up in the stratosphere; am not completely reconciled to receiving the Ketcham Award, but hope to get back to earth before long.''

Dr. Baker had prepared a short history of orthodontics which he planned to read at the luncheon, but time did not permit. I believe it would be remiss if these remarks were not included, so I present them as follows:

During the early years of modern orthodontics most of the cases were treated by the ''trial and error'' method. For a while it was routine practice by many to extract the maxillary first premolars in all distoclusion cases. The extraction of all the permanent first molars was advocated by some in cases of extremely crowded dental arches.

Bite blocks, consisting of extra wide bands, filled with cement, were used on posterior teeth in attempts to open the bite.

There was the Calvin S. Case technique for bodily tooth movement; also the Case retainer for maxillary anterior teeth.

Appliances were sometimes invented for unusual cases.

Plaster of Paris was generally used for impressions.

Lloyd S. Lourie invented a pair of pliers to cut spurs on arch wires, which would prevent wire ligatures from sliding along the wire. Later he produced a wire-stretching plier.

Charles A. Hawley provided a set of charts, showing sizes of teeth and shapes of dental arches, for guidance in making a diagnosis. Hawley also introduced his retaining appliance, which is still widely used.

Fifty years ago it was common practice to use a sharp steel probe in order to locate and get information regarding unerupted teeth. This was during the early days of roentgenography and the routine use of x-ray films was not generally adopted until about twenty years later.

Among the many types of mechanical appliances used, the following were quite popular:

Angle appliances: round labial arch wires (16 G.) with threaded ends sections; traction bars; jackscrews; and brass wire ligatures.

Knapp appliances: round labial arch wires, threaded their entire length; jackscrews and many other gadgets which could be screwed on to the arch wire; attachment bands which did not require soldering.

Canning flexible arches, with right-hand threads on one half and left-hand threads on the other half of the wire.

Ray Robinson's fine-gauge arch wires, with special gadgets for attachment to individual teeth.

A resilient arch wire, similar to Robinson's.

Victor Hugo Jackson's removable appliances.

Split vulcanite plates (some of these carried steel springs, and others carried jackscrews) for widening the maxillary arch. Some had clasps for retention of the appliance.

Headcaps and chin caps were used with occipital and cervical anchorage.

A variety of molar bands included clamp bands by Angle, Lukens, and Knapp. Plain bands in graduated sizes could be obtained and fitted to molar teeth; these were made of coin gold, German silver, or other metals. Buccal tubes were made to receive round, square, or oval arch wires.

Later, many operators discarded the clamp bands and made their own bands, usually fitting them to the teeth by the direct method instead of making them on a model in the laboratory. German silver arch wires and bands were frequently gold plated.

The foregoing will give you younger men an idea of the trials and tribulations encountered by these men in our Golden Anniversary Group. I expect that every one of them has fitted thousands of molar clamp bands and used miles of brass ligatures during the early years of his practice. And, if you look back through old dental literature, you will see that in many cases their treatment proved entirely satisfactory.

Now, in order to show that these "old timers" were interested in more than the mechanical phases of treatment, let me give you the titles of a few papers presented by some of the early sessions of this organization.

At the very first session, in 1901, Lloyd S. Lourie read a paper entitled "Is Orthodontia Justly Represented by its Teaching?"

In 1902 the following papers were among those comprising the program: "Nasal Occlusion and Septal Deviation in Their Relation to Antral Development and Facial Expression," by Royal S. Copeland, M.D.; "The Deformities of the Superior Maxilla From the Standpoint of the Rhinologist," by C. H. Kohler, M.D.; "Normal and Pathological Anatomy of the Alveolar Process and Adjacent Tissues," by M. H. Cryer, M.D.; "Malocclusion of the Teeth Among Ancient Peruvians," by Alton H. Thompson; and "Some Observations on Mouth Breathing," by William J. Brady.

In 1903 the program included the following papers: "The Conformation of the Face in Relation to the Development of the Eye," by F. Park Lewis, M.D.; "A Study of the Occlusion Relation in Cleft Palate Cases," by Rodrigues Ottolengui; "A Study of the Peridental Membrane from the Orthodontist's Standpoint," by Frederick B. Noyes; and "Heredity as an Etiological Factor in the Production of Malocclusion," by Martin Dewey.

So we must recognize the fact that these and other pioneers helped to blaze the trial and lay the foundation for the study of the growth and development of the dentofacial area, as well as to improve mechanical appliances and their use in treatment.

Before closing Dr. Baker expressed his appreciation to Dr. Bach for establishing this Golden Anniversary Group and for the committee assistance received last year by Dr. Bach, as well as for the committee help given to Dr. Baker this year in selecting eligible members and in organizing and planning the Golden Anniversary Luncheon.

Finally, to impress on the audience that the Golden Anniversary Group are really not old, Dr. Baker read a few lines that appeared on a birthday card he received last month.

HOW OLD ARE YOU?

Age is a quality of mind—
If you have left your dreams behind,
If hope is lost,
If you no longer look ahead,
If your ambitions' fires are dead—*then you are old.*
But, if from life you take the best,
And if, in life, you keep the jest,
If love you hold—
No matter how the years go by,
No matter how the birthdays fly, *you are not old.*

This report is respectfully submitted with great admiration for the Golden Anniversary Group.

Lowrie J. Porter.

GOLDEN ANNIVERSARY GROUP MEMBERS

Charter Members, 1953

1903 Charles R. Baker
*1898 Lawrence Baker
1902 Hugh T. Berkey
1892 E. Santley Butler
*1898 Frank M. Casto
*1903 Harold Chapman
1900 Harold M. Clapp
1896 Alfred M. Desnoes
1903 Walter H. Ellis
1898 Frank B. Evans
*1898 D. Willard Flint
*1898 Jacob A. Gorman
*1899 Abram H. Hoffman
1898 Henry F. Hoffman
*1903 Jesse F. Keeney
1897 Elmer E. Lampert
1890 Norris C. Leonard
*1900 Benno E. Lischer
1903 Harry L. Logan
*1899 Lloyd S. Lourie
1899 Frederick W. MacDonald
*1901 C. M. McCauley
1901 Walter C. Miner
*1900 Edward V. Morrison
*1895 Frederick B. Noyes
1903 Jay N. Pike
1896 Alfred P. Rogers
*1900 Frederick R. Stathers
1902 Robert H. W. Strang
*1893 Allen H. Suggett
1902 Earl W. Swinehart
1903 John E. Taylor
1898 Orville Van Deusen
1900 Leuman M. Waugh
1899 Oliver W. White

*Retired.

New Members, 1954

1904 Leslie Merle Christie
1904 Arthur V. Greenstein
*1904 Ralph Thomas Huff
1904 Andrew Francis Jackson
*1898 Charles R. Jackson
*1898 J. DeWolf Jackson
*1904 Ernest W. Patton
1902 Herbert Walker Taylor
1904 Albert E. Voss

Deceased, 1953-54

Henry Spenadel
William J. Speers

REQUIREMENTS FOR MEMBERSHIP IN THE GOLDEN ANNIVERSARY GROUP

The following are eligible for membership in the Golden Anniversary Group.

1. Those who graduated in dentistry fifty or more years ago.
2. Those who are now active members of The American Association of Orthodontists.
3. Retired members, who have been active members of this Association for at least ten years.

*Retired.

THE INTERNATIONAL LUNCHEON

THE International Luncheon was held in Chicago on Tuesday, May 18, 1954. Andrew Francis Jackson, Chairman of the Interrelations Committee, presided. Those honored at the luncheon were: Oren A. Oliver, Nashville, Tennessee, President of the Fédération Dentaire Internationale; Harold Hillenbrand, Chicago, Illinois, Secretary of the American Dental Association; and Nathaniel Liverone, Chicago, Illinois; Chicago Rotarian, nationally known speaker, philosopher, and wit.

The International Luncheon is becoming one of the features of the annual meetings of the American Association of Orthodontists, and this year it achieved even greater prominence. Not only was it exceedingly well attended, but those present listened to an inspired address by the brilliant speaker, Mr. Nathaniel Leverone of Chicago. Those who heard him regretted that his speech could not have been presented before the entire group of the organization.

Dr. Andrew F. Jackson of Philadelphia, who is equally at home in either the Spanish, Portugese, or English languages, opened the get-together with the observation that "the most important thing in anyone's life is his relations with his fellow man, and it naturally follows that the most important thing in the life of a nation is its relations with other nations. Therefore, the opportunity to greet our visitors from foreign lands was not only a duty, but a privilege, as no one can overestimate the influence of personal contacts in cementing good relations between nations."

The featured guests at the head table were to be Harold Hillenbrand, the capable secretary of the American Dental Association, and Oren Oliver, president of the Fédération Dentaire Internationale. However, due to the fact that Dr. Hillenbrand was called to a meeting of the World Health Organization, in which he represented the Voice of Dentistry, he was unfortunately not able to be present. His place was taken by Lon Morrey, editor of the *Journal of the American Dental Association*. The late Ernest Rowlett, past president of the Fédération Dentaire Internationale, a man of great culture and an intimate knowledge of the real position of dentistry in an international sense, indicated that he considered Dr. Hillenbrand as the most important single individual in dentistry.

In calling on those at the head table for a bow, the chairman remarked that the two personal qualities which made a man valuable to the society in which he lives are originality, in any shape or form, and executive ability. These two qualities combined in a single individual will ensure anyone's personal success. It was not strange, therefore, that a man who had contributed much to orthodontics and through the years had shown great executive ability and driving force should have risen to be the presiding officer of the F.D.I., a position which Oren Oliver had earned the hard way.

Others taking a bow for outstanding merit were our beloved Charles Baker, this year's recipient of the Ketcham Award, and Ray Webster, chairman of the American Board of Orthodontics.

The foreign visitors included the following:

Dr. Dela Barrera, Mexico.

Dr. Ram Nanda, Bombay, India.
Research work in human growth at University of Colorado Medical School for two years, and also two years' study in Boston.

Fig. 1.—Left to right: Lon Morrey, editor of *The Journal of the American Dental Association;* Oren Oliver, president of the Fédération Dentaire Internationale; Charles R. Baker, recipient of the Ketcham award; A. F. Jackson, chairman of the Interrelations Committee; James Ford, president of the American Association of Orthodontists; Nathaniel Leverone, guest speaker; and Ray Webster, chairman of the American Board of Orthodontics.
In the foreground: A. C. Broussard, William Murray, and Phil Adams. (Photograph by John Jackson.)

Fig. 2.—Left to right: Sam Gore, member of Interrelations Committee; Dela Barrera, Mexico; Ram Nanda, Bombay, India (two years' research work in human growth at the University of Colorado, and two years' study in Boston); Shingiro Takahashi, Tokyo, Japan (professor of orthodontics, Tokyo Medical and Dental University); and Lon Morrey, editor of *The Journal of the American Dental Association.* (Photograph by John Jackson.)

Dr. Shingiro Takahashi, Tokyo, Japan.
Professor of Orthodontics, Tokyo Medical and Dental University.

Dr. Alexis Eastwood, London, England.
Essayist; Associate, University College Hospital.

Mr. Josse de Never, Antwerp, Belgium.
Eastman Research program; member of council, Fédération Dentaire Internationale.

Mr. Gerald Franklin, Canada.
Member of Interrelations Committee.

In introducing Dr. Eastwood, of England, the chairman read some excerpts from a letter received by him from another Englishman, Dr. L. Russell Marsh, who was the featured speaker at the International Luncheon in 1949. From the response which greeted the reading of just two simple paragraphs, no man in that room will ever again be able to accuse an Englishman of not having a sense of humor!

The whole occasion was notable for the feeling of fellowship and cordiality which pervaded the atmosphere, and the expert and clever manner in which it was so ably handled by the chairman.

The International Luncheon has become an outstanding and traditional affair at the meetings of the A.A.O. and attracts a capacity house each year.

PAST PRESIDENTS' LUNCHEON

American Association of Orthodontists Past Presidents' Luncheon, Chicago, 1954.

Top row (left to right): James Ford, Brooks Bell, Bern deVries, Joe Johnson, Max Ernst, Lowrie Porter, and Earl Jones.

Middle row: Claude Wood, William Murray, H. C. Pollock, Leuman Waugh, W. E. Flesher, Charles Baker, and Oren Oliver.

Bottom row: Lloyd Lourie, Benno Lischer, W. R. Flint, Oliver White, Joseph Eby, and Walter Ellis.

In Memoriam

WILLIAM J. SPEERS
1877—1954

ON MARCH 12, 1954, the Northeastern Society of Orthodontists and the dental profession at large lost one of their most respected members, William J. Speers of Winchester, Massachusetts.

Dr. Speers was born Oct. 28, 1877, in Newport, Rhode Island, the son of the late Samuel and Mary Ann Elliott Speers.

He was graduated from the Harvard Dental School in 1902 and attended the Angle School of Orthodontia in 1905. He practiced dentistry in Newport, Rhode Island, until 1906, when he moved to Fall River, Massachusetts, where he practiced until 1927, at which time he went to Boston to become associated with Dr. Alfred P. Rogers in the exclusive practice of orthodontics. Subsequently, he established a part-time practice in Winchester, Massachusetts; after a number of years, he gave up his Boston practice and devoted his entire time to his Winchester practice. A few years ago his health began to fail and about one year ago he retired.

In 1908 he married Marion J. Fine. They had two children, William, Jr., and Mary Eleanor. Mrs. Speers died in 1948. In 1951 he married Mrs. Fay C. Browne.

Dr. Speers served as president of the Eastern Association of Graduates of the Angle School and the Massachusetts Dental Society. He was a diplomate of the American Board of Orthodontists; was instructor at the Forsyth Dental Infirmary and instructor in the postgraduate course in orthodontics (and other courses) at the Harvard Dental School for many years.

He was a member of the American Association of Orthodontists, Northeastern Society of Orthodontists, Omicron Keppa Upsilon fraternity, Harvard Odontological Society, Harvard Alumni Association, and other leading dental societies. He contributed to our literature through papers and clinics.

He was a member of the Harvard Club of Boston and the Winchester Country Club, a 32nd degree Mason, a member of the Shrine, and a member of the Hancock Congregational Church of Lexington, Massachusetts.

Dr. Speers was earnest, meticulous, and skillful in his art; gracious and kindly in manner; moderate and cautious in manipulation; never hurried and seldom worried. His patients were fond of him and put their trust in him. He had the faculty of making friends and keeping them. His social life was satisfying and full. He loved to entertain and did so in the manner of a

gracious host. His interest in golf stems from his early days in Fall River, where, on a tricky and difficult course, he became so proficient that few excelled him.

Dr. Speers was a fond husband and father. His son and daughter were to him an ever-present joy and delight.

We have lost a good friend, a fine orthodontist, and a man with all the attributes of a gentleman. The world of children is better for his having lived.

He is survived by his wife, Fay C. Browne Speers; a daughter, Mrs. David W. Emmons of Brookline, Massachusetts; and a son, William J. Speers, Jr., of Winchester, Massachusetts.

Whereas the orthodontics profession has lost a distinguished friend—a cultured gentleman in mind, deportment, and performance—who leaves a record throughout his life of fruitful accomplishment in all his obligations, be it

Resolved that our sense of bereavement be spread upon the minutes as a memorial, and be it further

Resolved that a copy of these resolutions be sent to members of his family as an expression of our deep sympathy and heartfelt condolence.

Walter H. Ellis, Chairman
Necrology Committee
Northeastern Society of Orthodontists.

Correspondence

Editors's Comment

In the April, 1954, issue of *The American Journal of Orthodontics* a manuscript was published entitled "Orthodontics Trends, Past and Present." As a comment to this article, a letter was received by the editor from Dr. Bernhard W. Weinberger, whose interest in dental history began with his publication, *Orthodontics, An Historical Review of Its Origin and Evolution,* which is a two-volume, 1,000 page work containing 600 illustrations. He is also the author of "The Historical Background of Modern Orthodontics" that has appeared in all editions of Dewey and Anderson's *Practical Orthodontics,* as well as the two-volume work, *An Introduction to the History of Dentistry,* which was published in 1948.

We feel that, while his comment was written for my personal information, it will prove of interest to the readers of this Journal, for it will add much to the current history of orthodontic progress.

Dr. Weinberger's letter follows.

To the Editor:

Your splendid and interesting article in the April issue of the Journal is by far the best analysis of the subject so far published. It is an historical document of the ideas, ideals, and trends during the many years that both of us have been in practice. We have witnessed many changes in concept; we have seen, or thought we had seen, orthodontics emerge from the days of trial and error, grow in stature, and at the same time revert, in some respects, to the days of old.

You have viewed the problems correctly, accurately and fairly, although there might be some who are not as close to the picture, or who have not been a part of it, who might take exception.

I feel that in some respects you have omitted some of the background, which might have given the newer generation a better understanding of just how things developed, and I should like to bring these omissions to your attention.

As to just when it all started, one should have some knowledge of what occurred prior to the World's Fair meeting in Chicago in 1893, for it was at the Ninth International Medical Congress, held in Washington in 1887, that these men met for the first time: George C. Ainsworth, E. H. Angle, Henry Baker, E. A. Bogue, C. S. Case, J. N. Farrar, C. L. Goddard, S. H. Guilford, V. H. Jackson, N. W. Kingsley, C. W. McGill, and others. For the next several decades all were to play an important part in orthodontic activity.

The one paper that created the greatest discussion and dissension was that by Angle (published in the *Transactions* and then reprinted in Haskell's *Student Manual,* 1890 edition, and considered Angle's first edition). As reported, the discussion centered upon the question of priority of discovery, and not the value of Angle's proposed treatment, method, or a consideration of orthodontic principles. In closing, the last discusser asked whether "the object of the section was to establish principles for guidance in the practice of the profession or to establish the precedence of certain better inventions. . . ." Thus, all entered into their lifework in the midst of criticism, attack, and antagonism, and many carried this ill feeling to the very day they died. How far-reaching was this influence of

disunity regarding types of appliances and the question of extraction is something that only those who lived through this period know. It did have have one desirable effect and that was to stimulate each to try to outdo the other. Thus, orthodontics did benefit.

During the last decade of the century, Angle endeavored to interest the dental colleges in changing the teaching of the subject. He failed in this and decided that if orthodontia was "to make any material progress, a separate school, entirely independent of the dental schools, must be formed."

What you have to say as to Angle, his school, and his pupils is correct, but I wonder what you are referring to when you say, "The Oppenheim, Hellman, Mershon, and Johnson group, while working separate and apart, seemed to see eye to eye on what orthodontics was all about. . . ."

While Angle had many faults, no one can take away his influence, and the influence of the school from 1900. As I view it, there were three separate factors of importance that helped to bring about the tremendous changes during the next three or four decades:

The first factor was the strict requirements that Angle required of his students upon entrance: a comprehensive knowledge of biology, embryology, histology, anatomy of the head and neck, and of dental anatomy. Those who succeeded in completing the course proved to be men of more than average ability, and they were the men who later were to play an important part in creating and directing the future of the specialty. While his students often failed to see eye to eye on the problem of treatment, they did absorb the spirit of investigation and creative thinking.

Second, the vast majority of the graduates of the school, while recognizing the importance of appliances, had been influenced by the other outstanding members of the faculty to continue their interest in subjects other than teeth and to investigate deeper into the "unknowns," for Angle once stated that he desired his pupils to be "not merely good technicians, but real students, investigators, and thinkers."

At the time Angle's health caused the school to cease, Martin Dewey began his school in Kansas City, then in Chicago for a year or two, before coming to New York. Just as long as Dewey continued the concept of Angle, with a good faculty, his school turned out good men who, in turn, aided in the development of orthodontics. When it became a one man's school it soon ceased to function. During this time the other schools you mentioned came into existence. All, however, seemed to lack that intangible something of the first school.

The third factor, and the one I believe had the greatest influence in bringing about a change, was the many alumni groups. The general unity of ideas, seeing eye to eye on what orthodontics was all about, expanded Angle's influence clear across the country and even to Europe. Many of these small groups now have become the sectional societies in the American Association of Orthodontists.

During the first decade of the present century it was a question of either a fixed appliance or one that was removable—Angle versus Jackson. Out of the fixed, or custom-made, appliances there appeared on the market many varied types that developed into systems—Angle, Knapp, Lukens, Brady, Canning, and others. As an indication that times have not changed, we still find this same tendency. We find a change in the name of the appliances, and they are introduced by new men, but the purpose is still the same.

As you have not considered the third factor, the influence of the societies, I should like to dwell upon it. How and why did the present subjects now being taught in post-graduate institutions, and mentioned by you, come into orthodontics? Just how were the "Oppenheim, Hellman, Mershon" and other influences born? These alumni groups, being small in number, while working separate and apart, all had a common purpose. The question as to appliances, except as a case report or a clinic, was never a part of the society meeting, which was devoted entirely to new subjects, or to a further consideration of some previously introduced subject.

Thus was orthodontics introduced to groups of varied interests. Outstanding scientists came to our assistance and in time there was established a closer relationship of interests, which we enjoy today. It was in that manner that we increased our curriculum

to include allergy, biology, education, endocrinology, child health, general embryology, growth, metabolism, hereditary, inheritance, rhinology, nutrition, orthopedics, radiography, pediatrics, structural deformities, psychology, and cephalometrics, as well as other subjects.

Were one to examine the Index to Periodical Dental Literature he would find that very few of these subjects were included therein until their presentation before an orthodontic group and after that, in dentistry, something for which dentistry has never given orthodontics credit. Thus, orthodontics has aided materially in changing the concept of dentistry from a mechanical profession to one that is now recognized as a learned profession.

It was this freedom of individual thinking, the desire to explore the "unknown," the willingness to tread where fools walk in but wise men fear, that prompted each member, at any time, to present a particular subject that he was thinking about. Each problem then was handed to the "committee," who in turn sought out an individual qualified to present a detailed paper and the answer. I well recall an early meeting in Baltimore, at which McCollum was present when Kelsey brought up the question of nutrition. We began to ask the guest questions, to which he replied, "Gentlemen, you are away ahead of me; allow me a year to think over the problem and I will be back to try and answer them." The next year he did return and thus was born his well-known theory of nutrition. It stimulated not only him, but such men as Shipley, Parks, Hess, and others. That was the spirit that prompted and stimulated those orthodontics pioneers, and as a result these subjects became a part of orthodontics and dentistry.

While many today might feel that these pioneers were amateurish in their concepts, and that the present generation, who are still living, are somewhat behind the times, they were, nevertheless, the men who created a new philosophy and a specialized profession that those of today are enjoying.

It was that composite group of men, plus the many who had become personal friends and associates and had absorbed their way of thinking, that brought about the great change in orthodontics. It was their encouragement and cooperation that permitted Hellman, Mershon, Oppenheim, Johnson, Howard, Broadbent, Brodie, and all the others to wander into the varied field of science, and they in turn stimulated others to widen their interests.

We must not lose sight of the fact that Friel, Chapman, Lockett, Oppenheim, and Grünberg carried this same spirit and influence into European orthodontics, aided by Matthews, Lindstrom, and the others, who in turn made important contributions to further the advancement of orthodontics.

Orthodontics has developed, but with it we still have some of the growing pains. You conclude, "It must cease its intolerance, based upon mechanical gadgetry, and focus its attention on ways and means to contribute its services to greater numbers of the people." This differs little from the thought expressed in the closing discussion at that 1887 meeting: "Whether the object of the Section was to establish principles for guidance in the practice of a profession, or to establish the precedence of certain better inventions." From this, it would seem that orthodontics is still "divided into component parts based on appliance indoctrination."

This subject might be explored further, but believe I have shown certain influences that will add to your thoughts. It was Hellman who once stated: "A band of fellows with like ideals will probably never form a closer circle and never achieve higher aims."

B. W. Weinberger
119 W. 57th St.
New York 19, N. Y.

Probably there is nothing so satisfying to any professional man as to know that his long, tedious efforts and treatments are appreciated. Many letters of this kind are received from orthodontists. However, the following is one

that is unique, and reflects great appreciation of the specialty of orthodontics. The orthodontist who sent this letter to the editor asked that his name be deleted.

DEAR DOCTOR:

Many thanks for your kind note to George. It is indeed a fine Christian act when a busy professional man takes time to give a youngster a few words of commendation and encouragement.

It might interest you to know that your note provoked Mrs. J. and myself into thought of evaluation of George's progress to this date in his young life. At age 6 we discovered that he was very near-sighted, so of course he had to wear glasses. At about the same time his teeth, as you well know, began to protrude badly; he soon was named "Bugs Bunny" by the kids. At this age he was a "bookworm" and showed exceptional musical ability at the piano, but we had him put these things aside and tried to make an "outdoors boy" out of him, encouraging him in sports, etc.

After you started work on his teeth, and through his ability to become proficient in most anything he set his mind to, he was no longer subject to nicknames and ridicule.

Even though there is no concrete proof, we strongly feel that George's life might not have been the same with crooked teeth; therefore, you have played a prominent part in his young life.

We are enclosing a clipping from his school paper which might interest you. We feel that George's highest accomplishment is the fact that he has a host of friends and is a fine Christian young man.

Department of Orthodontic Abstracts and Reviews

Edited by
DR. J. A. SALZMANN, NEW YORK CITY

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

Indices of Physiological Maturity: Derivation and Interrelationships: By Arline B. Nicolson and Charles Hanley, University of California. Reprinted (with deletions) from *Child Development* **24**: 3, March, 1953.

In this study both external and indirect signs of an individual's progress toward maturity were considered. The search for indicators of growth rests on the belief that maturity is largely determined by endocrine factors evidenced in various discernible phenomena. With this in mind, many workers in the field have used "growth indices" to classify subjects as "early," "average" or "late" maturers. Usually one such measure, e.g., age at menarche, is utilized, perhaps with others then related to it. The scores of individuals on many variables must be studied, however, before it is possible to estimate the relative validity of any one variable. One of the objectives of the present study, therefore, was to determine the degree of generality in adolescent physical growth by means of a factorial analysis of the intercorrelations among various measures of maturation. A second objective was to use the general factor, if one should be found in such an analysis, as a criterion from which the relative efficiencies of the single measures of maturation could be evaluated. Our final goal was to assign each young person a Maturity Score which would (a) be based on the best single measure or combination of measures of the hypothetical factor, and (b) fall along a continuous rather than dichotomous dimension.

GROUP STUDIED

The children included in the Guidance Study constituted a representative sample of those born in Berkeley, California, in 1928 and 1929. The parents of this sample, however, have a higher educational level than is true for the United States at large.

I. DEVELOPMENT OF INDICES

Indices used for girls were (a) age at menarche, (b) development of breasts, and (c) development of pubic hair; for boys, amount and patterning of pubic hair and size of penis and testes; and for both sexes, (a) age at reaching maximum growth, (b) skeletal development, (c) per cent of mature height, and (d) age of walking.

The method of assigning scores on the variables was the next problem. It was possible to score in terms of the variable itself (for example, the skeletal age an individual had attained at a given chronological age) or in terms of the chronological age at which a stated degree of maturation (i.e., a particular skeletal age) had been reached.

Following this over-all plan, an individual's chronological age score was computed for every index, and norms were calculated for each variable. Relationship between measures and ratings were determined by use of product-moment correlation coefficients.

Age at Maximum Growth

This index is the chronological age at which the largest increment in standing height occurs during the adolescent period.

From these progressively shifting annual increments, the mid-point of the largest was obtained and designated Age at Maximum Growth.

Since the graphic method gave a pictorial representation of this growth pattern for each individual and equalized increments over the whole age span in question, it was used to determine Age at Maximum Growth. Its reliability was checked by comparison with the results from the arithmetic method.

Determination of inter-rater agreement using the graphic method was made for each sex with and without the disparate cases. The results are presented in Table 1. The correlation coefficients are .80 for boys and .94 for girls when based on all determinations and .96 for both sexes when the cases with greater than half-year differences are omitted. On the basis of these data, the graphic method was used routinely to estimate Age at Maximum Growth for all cases where the difference between the two methods was less than one-half year, and the judges' choice governed the remaining 12 cases.

Table 2

Chronological age at which maximum growth is attained

Cases	Boys			Girls		
	N	*Mean* (years)	*Sigma* (years)	*N*	*Mean* (years)	*Sigma* (years)
All cases	86	13.77	1.17	87	11.51	1.13
Minus cases with greater than .50 difference in the two determinations	80	13.75	1.07	81	11.51	1.12

Means and standard deviations of Age at Maximum Growth scores are presented in Table 2. The average of Maximum Growth is 11.5 years for girls and 13.8 for boys. It is interesting to note that there is virtually no difference in these results whether one considers only the smaller, more reliable groups or adds the judges' ratings for the originally discrepant cases. The distributions of Age at Maximum Growth for both sexes are shown in the earlier maturation of the girls being strikingly apparent.

Skeletal Age Indices

Another index considered was skeletal age, or more specifically, the age at which various skeletal ages were reached. Skeletal ratings have frequently been used to distinguish early and late maturers.

X-rays of hand and knee, taken at half-yearly intervals from 8 to 18 years, had been rated prior to this study according to the Todd standards, which are spaced at six-months intervals.

In order to arrive at a suitable skeletal index, it was necessary to find the average chronological age at which various skeletal ages were reached. The skeletal ages used were chosen for the following reasons:

1. For girls, Skeletal Age 9.75 was the Skeletal Age which would reflect the growth status just prior to the maximum growth spurt. The equivalent Skeletal Age chosen for boys was 11.25.

2. For girls, the next Skeletal Age was 12.75, an age close to the average chronological age at menarche. In boys, the developmentally equivalent age was selected, 14.75.

3. The final skeletal stage for girls was, by Todd standards, a Skeletal Age of 16.25. In boys, however, the Skeletal Age at which complete closure of the epiphyses occurs (18.75) was not used, because many of our cases had not attained this growth by the time routine data collection ceased. Following Bayley, Skeletal Age 17.25 was used as the final stage. This is so close to mature status that subsequent changes may be considered slight.

The means, standard deviations, and distribution of scores are shown. It should be noted that the largest discrepancy between a Skeletal Age and the corresponding chronological age occurs at the last stage in boys. This may indicate that the sample at these ages was curtailed on the Skeletal Age dimension. Some of the late maturers had not reached Skeletal Age 17.25 by 18 years when routine data collection ceased. Many of these individuals were seen a year or more later, but frequently they had by then reached skeletal maturity. In such cases the chronological age of skeletal maturity could not be ascertained; hence, no interpolation to find Skeletal Age 17.25 was possible.

For boys, the chronological age at which Skeletal Age 11.25 was reached was compared with the Skeletal Age attained at a chronological age of 11.34 (the mean chronological age for 11.25) in order to see if these methods of handling the data were substantially different. The resulting correlation coefficient of + .94 indicates a high degree of agreement between the methods.

Per Cent of Mature Height

The use of Per Cent of Mature Height as a measure of maturity has several advantages and one major drawback.

Per Cent of Mature Height was obtained for each individual by determining the standing height measurement at the time of skeletal maturity, then calculating the percentage of this figure which occurred at any given age. Three types of mature height estimates were involved:

TABLE 4

MEAN AGE OF REACHING VARIOUS PER CENTS OF MATURE HEIGHT

Per Cent of Mature Height	Boys *N*	Boys *Mean Age*	Boys *S.D.*	Girls *N*	Girls *Mean Age*	Girls *S.D.*
45	72	1.3	.24	70	1.0	.19
50	66	2.2	.32	80	1.7	.22
55	84	3.3	.34	74	2.5	.34
60	87	4.6	.40	90	3.6	.36
65	88	5.9	.45	92	4.7	.41
70	86	7.3	.49	97	5.9	.47
75	83	8.9	.54	96	7.2	.52
80	92	10.6	.64	91	8.8	.58
85	90	12.4	.79	93	10.1	.68
90	89	13.7	1.04	93	11.4	.78
95	87	14.7	.98	91	12.5	.88
99	61	16.4	1.06	77	14.6	.90

The mean chronological ages for the various Per Cents of Mature Height are presented in Table 4. The norms at the late stages are liable to bias owing to the elimination of late maturers.

A graphic portrayal is given of the course of growth in Per Cent of Mature Height for both sexes by means of "growth tracks" which clearly indicate the earlier maturing of the girls.

AGE AT MENARCHE

It has long been recognized that age at menarche "is the reflection of the physiological state which may occur at different times during the puberal period in different individuals and which usually precedes by a considerable interval the attainment of the capacity to reproduce." Although menarche itself cannot be considered an entirely satisfactory criterion of maturity, it is readily obtainable, and because of its connection with endocrine factors, it is related to general physiological maturation.

Various measures of physiological maturity and their rationale are described. Data are reported for a representative, urban sample of approximately 180 boys and girls, who were measured annually from their first to their eighth year of life and semi-annually thereafter until they were 18 years of age.

Age norms for girls are presented with respect to the following objective indices: age of walking, three stages of pubic hair growth, three stages of breast development, age at maximum growth, age at menarche; three stages of skeletal growth every fifth per cent of mature height from 45 to 99 per cent, inclusive. The findings show that breast development of girls begins on the average at 10.6 years and reaches the adult stage on the average at 13.9 years. The average age at which pigmented pubic hair first appears in girls is 11.6 years; while the age at reaching the adult stage of pubic hair development was not reliably determined (average r between three judges was .61), but it was later than 13.2 years. The average age at menarche for this Berkeley sample is 12.8 years.

For boys, the norms cover the age of walking, four stages of primary and secondary sexual characteristics, age of maximum growth, three stages of skeletal development, every fifth per cent of mature height from 45 to 99 per cent, inclusive. The average age of the boys when the first signs of sexual changes appeared is 11.8 years and the average age of reaching the mature stage is 15.2 years. The average age of maximum growth for boys is 13.8 years as compared with an average age of 11.5 for girls.

To determine the degree of generality in adolescent growth, a factorial analysis (using Spearman's method) of the intercorrelations of these indices (excluding age of walking) was made. This analysis yields a general factor with high loadings in each index. With the exception of one index for boys (Skeletal Age 11.25), the factor accounts for well over half of the variance of each index, thus showing the high degree of relationship between measures as phenomenally different as pubic hair development and closure of certain epiphyses.

For both sexes, it appears that the age at reaching 90 Per Cent Mature Height is the best single measure of physiological maturity. For girls, the least adequate is Skeletal Age 16.25; for boys, Skeletal Age 11.25. The results indicate that when longitudinal data collected over a fairly wide temporal span are not available and the use of Per Cent of Mature Height indices thereby ruled out, measures of sexual or skeletal stages are satisfactory substitutes.

With the exception of the variable 90 Per Cent of Mature Height for boys, the combining of several indices in multiple regression equations results in better estimates of factor scores for each child, the multiple correlation coefficients ranging from .90 through .99.

A Maturity Score in standard score form which measured over-all adolescent physiological maturation is derived for each individual. This score (spreading over 4.5 standard deviations) represents the best possible estimate, for the indices used, of the standing of an individual relative to others in regard to the chronology of maturation. Covering a wide range of maturity scores, it offers statistical advantages not available in dichotomous early-late categories.

News and Notes

Fiftieth Annual Meeting of the American Association of Orthodontics

The program supplement was not in the hands of the editor in sufficient time to be printed in the JOURNAL in advance of the meeting. Therefore, it is herewith recorded as a matter of reader interest.

Program Supplement

RESEARCH ESSAY CONTEST OF THE AMERICAN ASSOCIATION OF ORTHODONTISTS

PRIZE WINNING ESSAY

The Integration of Facial Skeletal Variants: A Serial Cephalometric Roentgenographic Analysis of Craniofacial Form and Growth. S. Eugene Coben, D.D.S., M.S.

(Research was done in the Department of Orthodontics, College of Dentistry, University of Illinois, Chicago, Illinois. Dr. Coben completed his graduate orthodontic training at the University of Illinois in 1952. He graduated from Temple University Dental School in 1949.)

HONORABLE MENTION

Width of the Nasopharynx and Related Anatomical Structures In Normal and Unoperated Cleft Palate Children. Jacob D. Subtelny, D.D.S., M.S.

(Research was done in the Department of Orthodontics and Cleft Palate Training Center at the University of Illinois, Chicago, Illinois.)

HONORABLE MENTION

A Roentgenographic Investigation of the Effect of Orthodontic Treatment on the Relationship of the Alveolar Bone Proper to the Cemento-Enamel Junction. Donald Hodgkins Baxter, D.D.S., M.S.

(Research was done in the Department of Orthodontics, University of Washington, Seattle, Washington.)

CLINICS

The following two clinics were given on Wednesday afternoon. Information about them was received too late to be included with the other clinics listed in the original program.

No. 53. Treated Cases. Dr. Marcus D. Murphy, Houston, Texas.

No. 54. Facial Changes in Orthodontics. Dr. George S. Englert, Danville, Illinois.

1954 PROGRAM OF RESEARCH REPORTS

1:15 P.M. TO 5:00 P.M.

WEDNESDAY, MAY 19, 1954

THE PALMER HOUSE

CHICAGO, ILLINOIS

Program conducted by the Research Committee

Chairman, JOHN R. THOMPSON, Chicago, Illinois.

Presiding, THOMAS D. SPEIDEL, Minneapolis, Minnesota.

Reports dealing with related topics or common regions are listed in sequence in this program. Speakers were limited to ten minutes each.

BONE METABOLISM AND HORMONES

Studies in Bone Metabolism. Milton B. Engel, D.D.S., M.S., and Daniel Laskin, D.D.S., M.S., University of Illinois.

Acceleration of Cranial Growth of Young Rats Following Injection of Somatotrophic Hormones. Gordon R. Meeker, D.D.S., University of Illinois.

DENTO-ALVEOLAR TISSUES

*Early Tissue Changes Following Tooth Movement in Rats. Luz C. Macapanpan, M.S., D.M.D., University of Illinois.

The Movement of Vital and Devitalized Teeth in the Macacus Rhesus Monkey. Robert J. Huettner, D.D.S., M.S., and Robert W. Young, D.D.S., Columbia University.

*Apical Root Resorption Under Orthodontic Therapy. John R. Phillips, D.D.S., M.S.D., University of Washington.

Study of Crown Height of Teeth in Cases Treated by Extraction and Non-extraction. Robert E. Gibbs, D.D.S., University of Illinois.

Oro-Myometric Studies Related to Various Types of Occlusion. Herbert I. Margolis, D.M.D., Arthur L. Seiler, M.S.D., M.D., Prem Prakash, B.D.S., M.S., Tufts University.

TEMPOROMANDIBULAR REGION

The Development of the Squamoso-Mandibular Articulation in the Rat From 16 Days Insemination Age to 30 Days After Birth. John J. Cunat, D.D.S., University of Illinois.

An Experimental Study of the Changes in the Mandibular Fossa of the Rat Following Unilateral Condylectomy. Arthur M. Hayes, D.D.S., Columbia University.

A Radiographic and Clinical Study of Various Movements of the Mandible. Elizabeth J. Zwemer, D.D.S., M.S.D., Northwestern University.

An Electromyographical Analysis of Normal Functional Muscle Patterns of the Temporal and Masseter Muscles. Harold T. Perry, D.D.S., M.S.D., Northwestern University.

A Radiographic Analysis of Clinical Determination of the Transverse Axes of the Mandible in Normal, Retruded, and Protrusive Positions on Successfully Treated Orthodontic Patients. Harry C. Good, D.D.S., M.S.D., Northwestern University.

A Clinical and Radiographic Evaluation of a Method of Treatment of Patients Presenting Temporomandibular Dysfunction. Paul E. Draper, D.D.S., M.S.D., Northwestern University.

MORPHOLOGY AND GROWTH OF THE FACE AND TEETH

*A Correlative Study of Palato-Facial Growth Using the Cephalometric and Roentgenographic Cephalometric Technics. Alvaro C. Henriques, D.D.S., M.S., University of Pennsylvania.

*The Integration of Facial Skeletal Variants: A Serial Cephalometric Roentgenographic Analysis of Craniofacial Form and Growth. S. Eugene Coben, D.D.S., M.S., University of Illinois.

*A Study of the Dentofacial Anatomy in Normal and Abnormal Individuals, Employing Lateral Cephalometric Radiography and A Dental Surveying Machine. Harvey Jenkins, D.D.S., University of Toronto.

A Study of Certain Correlations in the Lateral Cephalometric X-ray. Leonard Frantz, D.D.S., University of Illinois.

A Comparative Study of Several Methods of Cephalometric Analyses in Clinical Orthodontic Diagnosis. Marion F. Dick, D.D.S., M.S.D., Northwestern University.

*Cephalometric Evaluation of Vertical Overbite in Young Adults. Frank Popovich, D.D.S., M.S.D., University of Toronto.

*The Mesiodistal Width of the Deciduous and the Permanent Teeth of the Same Children Together With Correlations Between and Among Them. Bruce W. Higley, D.D.S., M.S., University of Iowa.

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*Entered in Prize Essay Contest.

*A Radiographic Study of the Facial Structures of the Central Australian Aborigine. Arthur H. Craven, D.D.S., M.S., University of Illinois.

An Analysis of Tooth Size, Tooth Position, and Size of Supporting Area. Robert F. Taylor, D.D.S., M.S., University of Washington.

CLEFT LIP AND PALATE

A Cephalometric Study of the Growth and Development in Cleft Lip and Palate Individuals From Birth to 4 Years. Raleigh T. Williams, D.D.S., M.S.D., Northwestern University.

*Width of the Nasopharynx and Related Anatomical Structures in Normal and Unoperated Cleft Palate Children. Jacob D. Subtelny, D.D.S., M.S., University of Illinois.

An Electromyographical Analysis of the Temporal and Masseter Muscles in Mandibular Overclosure Associated With the Cleft Palate Patient. Thomas J. Zwemer, D.D.S., M.S.D., Northwestern University.

CLASS II MALOCCLUSION AND ORTHODONTIC TREATMENT RESULTS

*A Comparative Electromyographic and Cephalometric Analysis of Distoclusion at Two Age Levels in Children. Rowland D. Haryett, D.D.S., M.S.D., University of Toronto.

Dental Changes Accompanying Treatment of Class II Malocclusions by Extraoral Means. Robert Warren Baker, D.D.S., University of Illinois.

A Study of the Facial Skeletal Changes of Class II, Division 1 Malocclusion (Angle) by Orthodontic Treatment and Five Years After Active Treatment. Edwin Hagihara, D.D.S., M.S.D., Northwestern University.

A Cephalometric Radiographic Study of the Condylar and Incisal Guidance Presenting in Patients After Orthodontic Treatment and Retention. Paul E. Klein, D.D.S., M.S.D., Northwestern University.

A Cinefluorographic Evaluation of the Results of Orthodontic Treatment of Class II, Division 1 Malocclusions Which Previously Exhibited Posterior Translation of the Mandible and a Study of the Spatial Relationship of the Hyoid Bone. John V. Drake, D.D.S., M S., University of Washington.

TECHNICAL AIDS IN RESEARCH

Registration of Orthodontic Diagnostic Records for Statistical Evaluation. Saul M. Bien, D.D.S.

SUCKING HABITS

A Study of Intelligence Quotient and Manual Dexterity as Related to the Incidence of Sucking Habits in Children. A. W. Shanks, D.D.S., University of Toronto.

READ BY TITLE ONLY

(Listed alphabetically by author)

An Appraisal of Different Methods Used in Determining the Rest Position of the Mandible and the Resulting Free-Way Space by Cephalometric Roentgenograms. Roland M. Anderson, D.D.S., M.S., University of Washington.

A Cephalometric Evaluation of the Skeletal and Dental Pattern of 7- to 9-Year-Old Children With Excellent Occlusion. Frank P. Baird, D.D.S., M.S., University of Washington.

A Serial Cephalometric Study of Children With Excellent Occlusion Using Angular and Linear Measurements. John Q. Barnes, D.D.S., M.S., University of Washington.

*A Roentgenographic Investigation of the Effect of Orthodontic Treatment on the Relationship of the Alveolar Bone Proper to the Cemento-Enamel Junction. Donald H. Baxter, D.D.S., M.S., University of Washington.

A Study of the Incidence of Malocclusion and Facial Characteristics in Seattle High School Students Aged 15 to 20 Years. Samuel R. Blake, D.D.S., M.S., University of Washington.

Standardized Radiography Applied to Patients With Abnormal Growth and Development Patterns. Melvin I. Cohen, D.M.D., Harvard University.

A Study of Dentofacial Morphology and Temporalis Muscle Activity in Normal 7-Year-Old Children, Employing Cephalometric Radiography and Electromyography. Edward B. Cook, D.D.S., and George W. Street, D.D.S., University of Toronto.

*Entered in Prize Essay Contest.

A Serial Cephalometric Study of the Rest Position of the Mandible in Edentulous Individuals. J. A. R. Coulombe, Jr., D.D.S., M.S., University of Washington.

A Serial Cephalometric Study of the Rest Position of the Mandible in Patients With Excellent Occlusions. Eugene F. Butori, D.D.S., M.S., University of Washington.

A Serial Cephalometric Study of Facial Patterns in Children Having Excellent Occlusion and Class II, Division 1 Malocclusion Using Angular Measurements. John D. Desposato, D.D.S., M.S., University of Washington.

An Analysis of Dental Casts of Patients Made Before and After Orthodontic Treatment. Aldo A. Dona, D.D.S., M.S., University of Washington.

A Cephalometric Study of Relationships of the Maxillary and Mandibular Central Incisors of Children Having Excellent Occlusion and Class II, Division 1 Malocclusion. Richard O. Failor, D.D.S., M.S., University of Washington.

A Dentofacial Study of Seattle High School Students Aged 15 to 20 Years. Kenneth E. Gibbs, D.D.S., University of Washington.

Serial Study of Dental Eruption During Later Childhood. Joseph W. Janda, D.D.S., M.S., University of Minnesota.

A Cephalometric Evaluation and Comparison of Two Methods of Treatment of Class II Malocclusion in the Mixed Dentition. William C. McGovern, D.D.S., M.S., University of Washington.

A Cross-Sectional Study of Vertical Facial Dimensions of Children With Excellent Occlusions. Raymond W. McNair, D.D.S., M.S., University of Washington.

Reproducibility of Radiographic Recordings of Rest Position of the Mandible. John H. McNutt, D.D.S., University of Minnesota.

A Cephalometric Evaluation of Class II Malocclusions in the Mixed Dentition Treated by Occipital Anchorage. Archie E. Peterson, D.D.S., M.S., University of Washington.

A Cephalometric Study of Excellent Occlusion and Class I Malocclusion of Children and Adults. Benedict J. Petraitis, D.D.S., M.S., University of Washington.

A Study of Angular Relationships of the Mandibular Incisors. Kenneth M. Roberts, D.D.S., M.S., University of Washington.

Extraalveolar Cephalometric Appraisal During Treatment: A New Approach. Thomas J. Watson, D.M.D., Washington University, St. Louis.

A Cephalometric Study of Size Relationships of the Normal Male Soft Palate. Robert H. Willis, D.D.S., M.S., University of Washington.

A Lateral Cephalometric Study of the Skeletal Pattern in Cleft Palate Patients from 6 to 13 Years of Age. Malcolm Yasny, D.D.S., University of Toronto.

Early Tissue Changes Following Tooth Movement in the Laboratory Rat at Varying Periods of Time After the Application of Stress. Peter K. J. Yen and Julian M. Rothblatt. Harvard University.

Golden Anniversary Group

LUNCHEON—RED LACQUER ROOM

MONDAY, 12:15 P.M.

The names of the thirty-six men who were honored by membership in the Golden Anniversary Group in 1953, when this organization was established, appear in the luncheon program.

According to available records, the following persons are eligible for membership this year:

Year Graduated	
1904	LESLIE MERLE CHRISTIE, 1835 Eye St., Washington, D. C.
1904	ARTHUR V. GREENSTEIN, 1 West 81st St., New York 84, New York
1904	RALPH THOMAS HUFF, 4553 8th Ave. N., St. Petersburg, Florida
1904	ANDREW F. JACKSON, Medical Arts Bldg., Philadelphia, Pennsylvania

1898	CHARLES R. JACKSON, 9170 Shirley Dr., LaMesa, California
1898	J. DE WOLF JACKSON, 223 Coyle Pl., San Antonio, Texas
1904	ERNEST W. PATTON, 707 Euclid Ave., Birmingham 9, Alabama
1902	HERBERT WALKER TAYLOR, 510 Madison Ave., New York, New York
1904	ALBERT E. VOSS, Professional Bldg., Los Angeles, California

Committee
Golden Anniversary Luncheon

RAY M. CURTNER----------San Francisco
LOWRIE J. PORTER----------New York
CHARLES R. BAKER, *Chairman*----------Evanston

American Board of Orthodontics

The American Board of Orthodontics held its annual five-day meeting May 11 through 15, 1954, for the purpose of conducting routine business and the examination of candidates aspiring to certification.

The new director to the Board by unanimous agreement is Wendell L. Wylie, University of California, San Francisco, California. He replaces William E. Flesher, who had served a term of two years, filling the unexpired term of Reuben Olson.

This was the second time William Flesher had served on the Board, having previously been a director from 1936 through 1944. It was noted with interest that our retiring director had served on the Board with all but nine of the directors who have constituted the A. B. O. since its inception in 1929. Because of his contributions, the Board placed the following tribute to him in its Minutes:

"By acclamation, it was voted that the Minutes record the Board's great appreciation for the services of Dr. Flesher, the retiring director."

Subject to the approval of the House of Delegates of the American Dental Association at its 1954 meeting it was voted to grant affiliate certificates to affiliate members of the American Association of Orthodontists, provided they meet all other requirements of the A. B. O. except that of citizenship in the United States. It also was found necessary to raise the application fee for certification by the Board to $150.00, effective immediately.

Certification was granted thirty-three candidates as follows:

Sidney Brandt	10 Park Pl.	Morriston, N. J.
Leonard T. Campi	601 Bangs Ave.	Asbury Park, N. J.
Robert M. Cole	60 Benedict Ave.	Tarrytown, N. Y.
H. Milton Cooper	241 Main St.	Hackensack, N. J.
Solon P. Crain	304 N. Alleghaney	Odessa, Texas
Earl R. Crane	902 "D" St.	San Bernardino, Calif.
William D. Curtis	1726 Eye St., N.W.	Washington, D. C.
Herman Dahl	835 Medical Arts Bldg.	Tacoma, Wash.
Gerard A. Devlin	49 Bleeker St.	Newark, N. J.
Herbert S. Fine	2 Gramatan Ave.	Mt. Vernon, N. Y.
Abraham I. Fingeroth	650 Main St.	New Rochelle, N. Y.
Robert C. Germond	705 Hotel Jamestown	Jamestown, N. Y.
Maurice M. Gershater	15 Longview Ave.	White Plains, N. Y.
T. M. Graber	670 N. Michigan Ave.	Chicago, Ill.
James J. Guerrero	5522 W. North Ave.	Chicago, Ill.
Burton A. Hoffman	333 Linwood Ave.	Buffalo, N. Y.
C. Douglas Hoyt	12 Woodland Dr.	Fair Haven, N. J.
Louis Kreshtool	1700 Washington St.	Wilmington, Del.
Harold E. Leslie	394 Bloor St., W.	Toronto, Ontario
Joseph Luban	30 South Broadway	Yonkers, N. Y.

Leo B. Lundergan	8230 Forsyth Ave.	St. Louis, Mo.
William P. McGovern	1315 Medical Arts Bldg.	Tacoma, Wash.
William S. Parker	701 Medico Dental Bldg.	Sacramento, Calif.
Julius A. Seemann	136 Market St.	Perth Amboy, N. Y.
Earl E. Shepard	4500 Olive St.	St. Louis 8, Mo.
Doyle J. Smith	1399 Madison Ave.	Memphis, Tenn.
Walter G. Spengeman	30 South Broadway	Yonkers, N. Y.
Morris M. Stoner	40 W. 38th St.	Indianapolis, Ind.
Harold K. Terry	1425 S. E. 4th St.	Ft. Lauderdale, Fla.
Harold E. Thompson	6314 Brookside Plaza	Kansas City, Mo.
Robert L. Whitney	90 North Oakland Ave.	Pasadena, Calif.
Guy A. Woods, Jr.	1400 N. E. 37th St.	Portland 13, Ore.
Harry B. Wright	616 Medical Arts Bldg.	Philadelphia, Pa.

The next meeting of The American Board of Orthodontics will be held at the Fairmont Hotel in San Francisco, California, May 3 through May 7, 1955. Orthodontists who desire to be certified by the Board may obtain application blanks from the secretary, Dr. C. Edward Martinek, 661 Fisher Bldg., Detroit 2, Michigan.

Applications for acceptance at the San Francisco meeting, leading to stipulation of examination requirement for the following year, must be filed before March 1, 1955. To be eligible, an applicant must have been an active member of the American Association of Orthodontists for at least three years.

Denver Summer Meeting

The readers of the JOURNAL will be interested in an announcement of the Seventeenth Annual Meeting of the Denver Summer Meeting for the Advancement of Orthodontic Practice and Research (formerly the Denver Summer Seminar) at the Park Lane Hotel in Denver, Colorado, Aug. 1 through 6, 1954.

Clinicians and subjects:

Wilton M. Krogman, Ph.D., Professor of Physical Anthropology, Graduate School of Medicine and Evans Institute of Dentistry, University of Pennsylvania. 1. THE PHYLOGENIC BACKGROUND OF CRANIOFACIAL GROWTH. 2. THE PROBLEM OF RELIABILITY IN CEPHALOMETRIC TECHNIQUES.

Alton W. Moore, D.D.S., Department of Orthodontics, University of Washington School of Dentistry, Seattle, Washington. 1. CEPHALOMETRIC TECHNIQUES IN EVALUATING THE RESULTS OF CLINICAL PROCEDURES IN ORTHODONTICS. 2. THE EFFECT OF ORTHODONTIC TREATMENT ON THE TEMPOROMANDIBULAR JOINT. 3. FACIAL GROWTH AND ITS SIGNIFICANCE IN ORTHODONTIC TREATMENT PROCEDURES. 4. BODILY VERSUS TIPPING MOVEMENTS OF TEETH IN ORTHODONTIC THERAPY.

Robert W. Donovan, D.D.S., Instructor in Orthodontics, Northwestern University Dental School, Chicago, Illinois. 1. NORMAL AND ABNORMAL FUNCTION OF THE TEMPOROMANDIBULAR JOINT. 2. THE USE OF MANDIBULAR REFERENCE POSITIONS IN CLINICAL DENTISTRY. 3. FUNCTIONAL ANALYSIS IN ORTHODONTIC TREATMENT.

Ram S. Nanda, B.D.S., Research Fellow in Orthodontics and Growth, Child Research Council, University of Colorado School of Medicine, Denver, Colorado. THE GROWTH OF HUMAN FACE, A REPORT BASED ON THE STUDY OF SERIAL CEPHALOMETRIC ROENTGENOGRAMS.

William S. Brandhorst, D.D.S., Assistant Professor of Orthodontics, Washington University School of Dentistry, St. Louis, Missouri. 1. THE PROBLEM OF REPOSITIONING THE MANDIBLE. 2. CHANGES DURING TREATMENT WITH LABIOLINGUAL (INCLUDING THE OCCLUSAL GUIDE PLANE) AND TWIN WIRE APPLIANCES.

Symposium discussion leader: *William R. Humphrey,* D.D.S., Practitioner and Charter Member of the Denver Summer Meeting. POSSIBILITIES AND LIMITATIONS OF ORTHODONTIC TREATMENT AND GROWTH.

Northeastern Society of Orthodontists

The Fall Meeting of the Northeastern Society of Orthodontists will be held at the Hotel Statler, Buffalo, New York, on Oct. 25 and 26, 1954.

Southern Society of Orthodontists

The Southern Society of Orthodontists will hold its next annual meeting in Washington, D. C., Oct. 31 through Nov. 3, 1954, at the Mayflower Hotel.

Southwestern Society of Orthodontists

The Southwestern Society of Orthodontists will hold its next meeting Oct. 10 through Oct. 13, 1954, at the Skirvin Hotel, Oklahoma City, Oklahoma.

Temple University School of Dentistry

A course in "Clinical Occlusion" will be given at Temple University School of Dentistry, Jan. 26, 27, and 28, 1955, by Dr. Lewis Fox of South Norwalk, Connecticut.

Oliver W. White Honored as Outstanding Dentist of the Year in Michigan

Dr. Oliver Wilson White, of Detroit, pioneer orthodontist, was honored at the ninety-seventh annual meeting of the Michigan State Dental Association "for accomplishments of good for his profession and service to the public." Dr. White was honored especially for his work with the Children's Fund of Michigan. A boyhood friend of the late Senator James Couzens, donor of the $17,000,000 fund, Dr. White convinced the philanthropist that dental health should be a part of the fund's program.

A result has been, his colleagues said, that dentistry and dental health are advanced in Michigan. He got the appropriation which made possible tooth decay studies at the University of Michigan.

In addition to his private practice, Dr. White has been director of the dental clinic of the Children's Hospital of Michigan since 1927. He is a past president of the Detroit District Dental Society, Michigan State Dental Association, American Society of Orthodontics, and the American Board of Orthodontics.

Dr. White studied dentistry at the University of Michigan. He taught at the university before coming to Detroit to practice. Dr. White took postgraduate work at the Angle School of Orthodontia.

Dr. White was the originator of the Detroit Dental Aid, created to help underprivileged children. This was one of the activities noted in the citation by the state association.

He is an associate member of the Wayne County Medical Society and an honorary member of several organizations. The University of Michigan awarded him the honorary degree of Master of Science in 1940.

The American Institute of Dental Medicine

The next Annual Meeting of the Institute will take place at the Desert Inn, Palm Springs, California, Oct. 31 to Nov. 4, 1954. The faculty will consist of the following.

William A. Albrecht, Ph.D., University of Missouri, Columbia, Missouri: Soil and Nutrition. I. Evidence from Soil Exploitation. II. Services from Soil Treatments; "Let Rocks Their Silence"; Droughts. The Soils as Reasons for Them.

Charles H. Best, M.D., D.Sc., University of Toronto, Toronto, Canada: The History and Action of Insulin; Recent Work on Carbohydrate and Fat Metabolism; Dietary Factors in the Protection of Liver, Kidneys, and Heart.

Gordon M. Fitzgerald, D.D.S., University of California, San Francisco, California: X-ray Radiation, Its Dynamics and Management; Radiation Protection Planning for the Dental Office; Practical Roentgenographic Interpretation in Dental Medicine.

Maynard K. Hine, D.D.S., Indiana University, Indianapolis, Indiana: Principles of the Treatment of Periodontal Disease; Oral Microbiology; Diseases of the Tongue and Other Oral Lesions.

Ernest Jawetz, Ph.D., M.D., University of California, San Francisco, California: The Rational Use of Antimicrobial Agents: Reason versus Emotion in Chemotherapy; Virus Infections of Interest to the Dentist and Therapeutic Approaches; The Rise and Fall of Focal Infection.

Joseph P. Weinmann, M.D., University of Illinois, Chicago, Illinois: The Adaptation of the Periodontal Membrane to Physiologic and Pathologic Changes; Bone Formation and Bone Resorption; Variations in the Structures of Bone Tissue and Their Significance in Radiology.

Temple University

Temple University of Philadelphia, Pennsylvania, has announced a two-week course in orthodontics for practicing orthodontists under R. H. W. Strang, D.D.S., Jan. 23, 1955, to Feb. 5, 1955.

Notes of Interest

Fred Fabric, D.D.S., M.S., announces the removal of his office to Suites 4-5, Brown Bldg., 101 South Meramec Ave., Clayton 5, Missouri.

Dr. Joseph K. Gold and Dr. Ira D. Gilbert wish to announce their association in the practice of orthodontics at 316 High St., Holyoke, Massachusetts.

Dr. Harold H. Gilbert announces the removal of his offices to 4308 Liberty Heights Ave., Baltimore 7, Maryland, practice limited to orthodontics.

Dr. Marvin C. Goldstein announces the removal of his offices to Suite 101, Medical-Dental Bldg., 950 West Peachtree St., Atlanta, Georgia, practice limited to orthodontics.

Dr. Hudson G. Kelley announces the opening of his office for the exclusive practice of orthodontics at 445 North Pennsylvania St., Indianapolis 4, Indiana.

Kenneth Monroe Roberts, D.D.S., M.S., announces the opening of offices for the practice of orthodontics, 710 General Insurance Bldg., Seattle 5, Washington.

Dr. Neal M. Roth announces the opening of his office, practice limited to orthodontics, at 403 St. James Bldg., Jacksonville, Florida. He also has assumed the practice of the late Dr. I. W. Bull.

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The AMERICAN JOURNAL OF ORTHODONTICS is the official publication of the American Association of Orthodontists and the following component societies. The editorial board of the AMERICAN JOURNAL OF ORTHODONTICS is composed of a representative of each one of the component societies of the American Association of Orthodontists.

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